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ABSTRACT

This document identifies skill standards for lead abatement in a manner that is easy to understand, useful, and meaningful to workers, educators, trainers, labor leaders, contractors, and project owners. To meet the needs of the various users of this document who will have a different application of the standards and seek different information, the standards have been designed with four informational components. The scenario describes the abatement process and conveys the context of applications of workplace skills, knowledge, and aptitudes. Conventional industry standards contain proficiency, health and safety, and production requirements that serve as performance criteria. Key tasks are selected from a master task list as identified and rated by incumbent workers. Only the tasks rated as most important and most frequently performed are included. A list of workplace skills, knowledge, and aptitudes (WSKAs) follows. These standards are included: personal preparation and decontamination; worker protection and personal protective equipment; residential containment; residential abatement: component removal and paint stripping; residential abatement: enclosure and encapsulation; structural containment; structural abatement; and cleanup. A final section contains detailed descriptions of key WSKAs, including the context, mastery performance level, content for training, and references to job functions and key tasks and activities in which the WSKA is included. (YLB)

Lead Abatement Worker Skill Standards

Laborers-AGC Education and Training Fund

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Introduction

Origin and Purpose of Skill Standards

The Laborers-AGC Education and Training Fund (Laborers-AGC) Business and Education Skill Standards Project (BESP) is one of 22 pilot projects designed to develop and use workplace skill standards to help the North American work force compete in an increasingly global marketplace. Funded in part by a grant from the U. S. Department of Education, the project's main goal is to generate world-class skill standards based on an analysis of the tasks a worker performs on the job, as well as the skills, knowledge, and aptitudes necessary to perform the work successfully.

Laborers-AGC elected to undertake this project to improve the skills of construction craft laborers and increase the market share of their employers in the heavy construction and environmental remediation industries.

"The changing workplace and marketplace demand that LIUNA take the lead in setting training and skill assessment standards in order to offer our members and signatory contractors the best service in the industry. As always, we are ready to meet the challenge."

Arthur A. Coia, General President
Laborers' International
Union of North America

Laborers-AGC believes that these skill standards will:

- Promote recognition of the construction craft laborer's numerous and varied skills.
- Enable trainers and educators to develop curricula that are relevant to the industries.
- Assist labor unions and employers in gaining market share by ensuring the skills of their workers.

For skill standards to be effective, workers, educators and trainers, labor union officials, and contractors and suppliers must use the standards.

- *Workers* must review the standards and seek training in areas in which they are not skilled.
- *Educators and trainers* must adopt the standards and pattern their curricula and assessments around them.
- *Labor union officials* must acknowledge the value of workers who possess these skills and encourage their members to obtain them.

- *Contractors and suppliers* must demand workers who possess these skills and continually provide feedback to educators and trainers about the quality of training.

Development of Skill Standards

In an effort to make these skill standards useful for all stakeholders, Laborers-AGC invited experts from labor, management, and education to join two coalitions to guide the process. One coalition directs the development of skill standards for the heavy construction industry and the other directs the work for the environmental remediation industry.

During development, staff used two task identification techniques—Modified DACUM (Develop A Curriculum) sessions and the Extended Search of published references—to generate a list of tasks, skills, knowledge, and aptitudes for each job.

"The most important part of the pilot project was the front-line worker interviews. These interviews allowed working construction craft laborers to describe in detail the skills they need and equally important, what skills they expect their coworkers to possess."

John Tippie, Project Director
Laborers-AGC Business and Education Standards

To ensure that the tasks included were valid and important to each of the jobs, three validation techniques (i.e., structured interviews, critical incident discussions, and surveys) were used with front-line workers, trainers, and supervisors. More than 200 construction craft laborers from different areas of North America were interviewed and asked to rate the importance and frequency of the tasks, skills, knowledge, and aptitudes.

The project aimed to compile a complete industry viewpoint on the tasks performed by workers in each of the job categories investigated. Validation sessions were conducted throughout North America to ensure geographic representation of the construction processes and tasks. Similarly, both union and nonunion workers were invited to participate in the interviews and surveys to ensure that a full array of practices were considered.

Figure 1 depicts how these skill standards fit into the environmental remediation industry.

LEAD ABATEMENT WORKER SKILL STANDARDS

OCCUPATION:

A set of jobs that provide lifelong employment. A single occupation may encompass several industries (as defined below).

INDUSTRY:

A major grouping within the Standard Industrial Classification system (SIC). This term describes a broad collection of occupations that function together or separately to produce products. The industries addressed in this project include those involved in heavy/highway construction and those in environmental remediation activities (SIC Groups 16, 17, 49 & 87).

JOB TYPE:

The job types addressed in this project include Lead Abatement Worker, Petro-Chemical Remediation Worker, Concrete Worker, and Pipe Layer. This document only addresses the skill standards associated with Lead Abatement Worker.

TYPE OF WORK:

Hazard abatement of lead-based paint occurs primarily in residential buildings and on large steel structures. Although different types of buildings and steel structures make each project unique, there are similar steps required to protect the worker from lead contamination. Most notable are steps for Personal Preparation, Worker Protection, and Clean Up. For that reason, those work activities are presented separately.

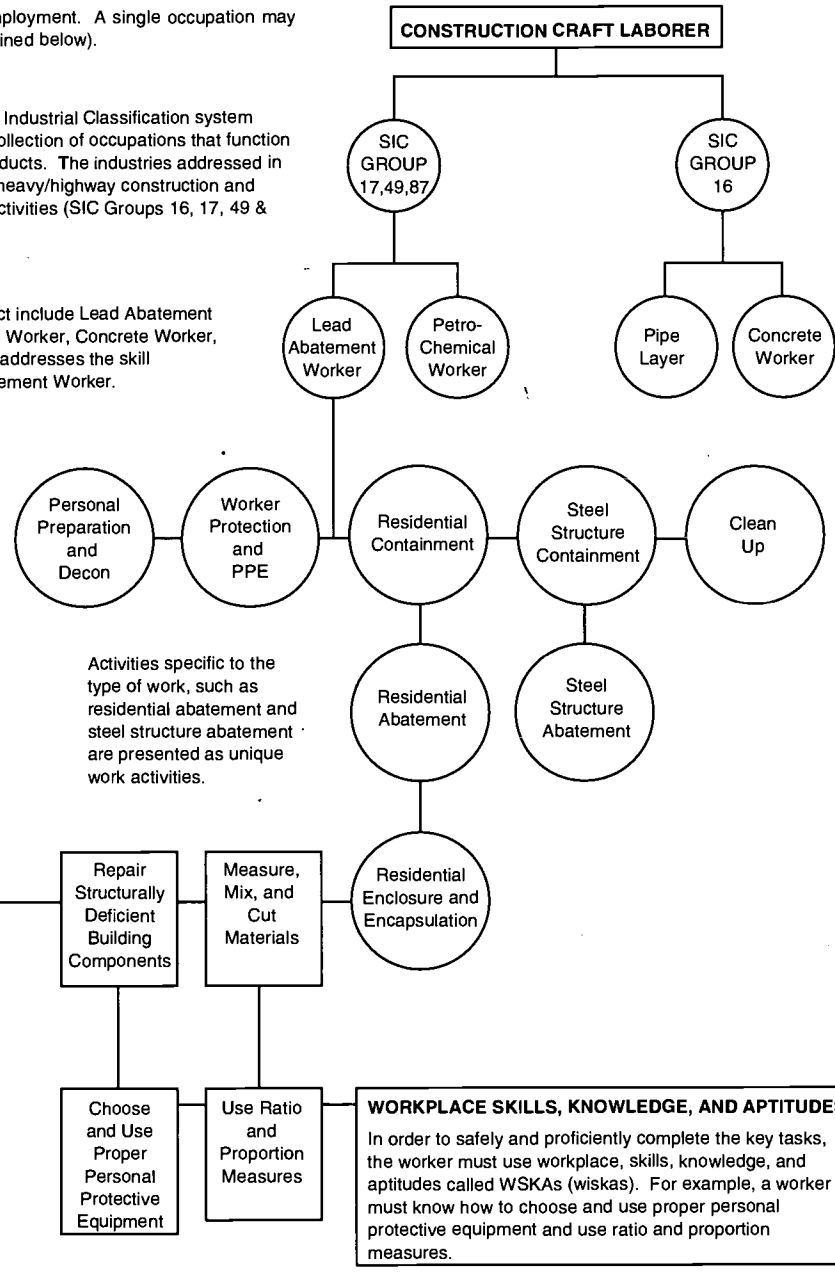


Figure 1
BESP Structure

Use of Skill Standards

The purpose of this document is to identify skill standards for lead abatement in a manner that is easy to understand, useful, and meaningful to workers, educators, trainers, labor leaders, contractors, and project owners. To best achieve this goal, the coalition selected a format that uses scenarios to provide the reader with a picture of the abatement process under consideration. The scenarios are designed specifically to provide a general description of the lead abatement process. They are not intended to describe or prescribe craft worker jurisdictions or specialty construction methods and should not be interpreted as such.

Since there are many different types of lead abatement practices and each must be performed under different conditions, these skill standards cannot completely describe each practice. Instead, Laborers-AGC elects to identify and describe the work practices and skills most common to all job sites and regions.

The coalition envisions the standards will be used by many entities. However, we anticipate the primary users will be prospective and existing lead abatement workers, the educational community, environmental remediation contractors and their associations, training organizations, and labor organizations.

Each of these entities will have a different application of the standards and each will seek different information. For that reason, we have designed the standards with four informational components:

1. **Scenario** – The scenario describes the abatement process and conveys the context of the various applications of workplace skills, knowledge, and aptitudes. In addition, the scenario includes or implies conventional industry standards that can serve as performance criteria.

2. **Conventional Industry Standards** – Conventional industry standards contain proficiency, health and safety, and production requirements that serve as performance criteria. This information provides valid criteria for the design and implementation of assessment routines and informs the reader of the quality required during various steps of the abatement procedure.

3. **Key Tasks** – Key tasks are selected from a master task list as identified and rated by incumbent workers. Since it would be too time-consuming to present the complete task list for every operation, only the tasks rated by workers as the most important and most frequently performed are included.

4. **Workplace Skills, Knowledge, and Aptitudes** – Relevant Workplace Skills, Knowledge, and Aptitudes (WSKAs) are listed with the standard's other components. In addition, directly following the standards is a section containing detailed descriptions of key WSKAs as identified and verified by workers. Each WSKA includes the context, the mastery performance level, the content for training, and scenario(s) and relevant tasks to which it applies. The information enables curriculum development and performance assessment.

Organization of Skill Standards

As shown in Figure 2, each standard is presented on facing pages with the scenarios located adjacent to the key tasks, conventional industry standards, and WSKAs. The design and format enable every potential user of these standards to find the information they require quickly and efficiently.

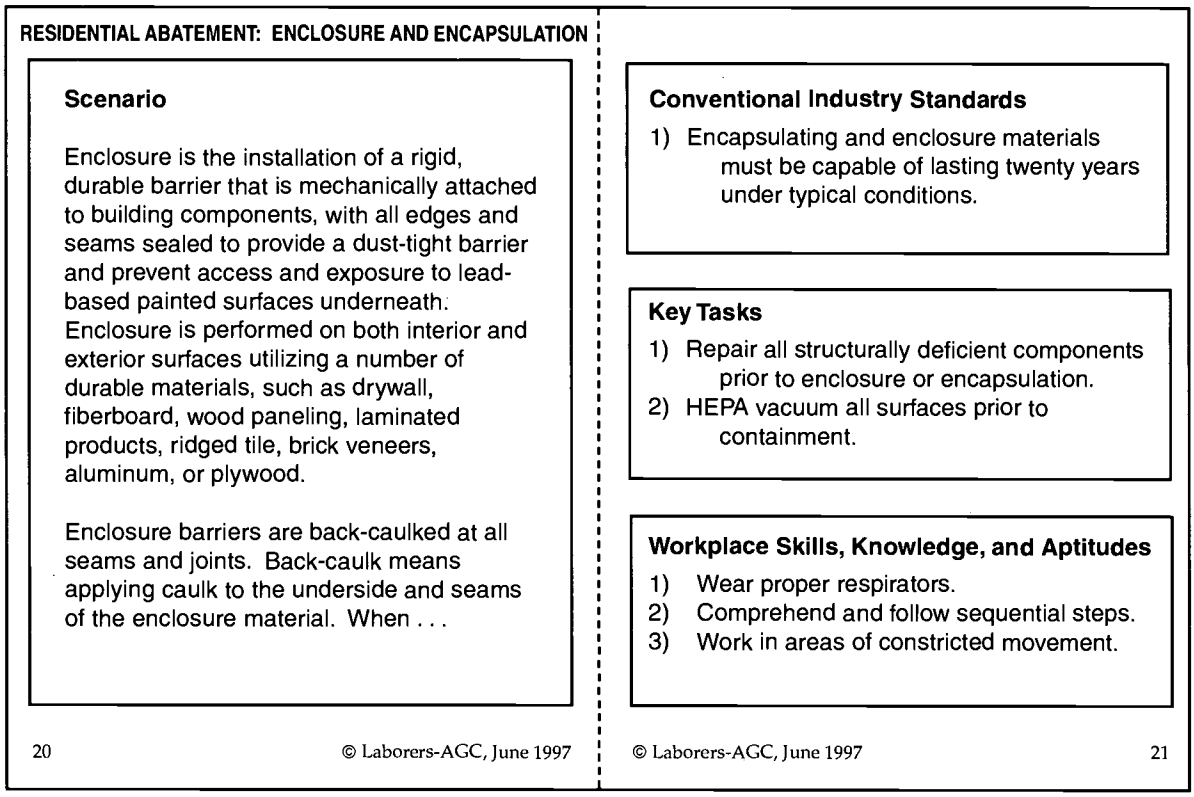


Figure 2
Sample Skill Standard Layout

The anticipated users, as well as the information and benefits they will derive from the standards follow.

Workers

Workers in the abatement industry should use these standards as a benchmark for the skills they must possess to be successful in the described workplace. These standards reflect what employers expect of workers; therefore, without the skills, knowledge, and aptitudes, job prospects and consistent earnings will be more difficult to attain.

A worker should read the scenarios to recognize which aspect of a job is being described. Next, the worker should read the key tasks associated with that scenario, making sure he or she knows how to perform each task. This document can be used as a checklist. When the worker encounters a skill he or she does not possess, he or she should seek outside or on-the-job training, or begin self-study of the skills he or she does not yet have. To be considered proficient in these tasks, the worker must be able to perform the tasks according to conventional industry standards and recognize that different jobs may require different skills.

Workers also can compare their current skill levels in math, communication, safety, and other topics with the information found in the WSKA portion of these skill standards. The WSKAs are considered prerequisites for performance of the relevant tasks. Again, a worker can determine what prerequisite skills he or she needs by comparing his/her knowledge with the WSKA list.

To increase marketability, a worker should take an inventory of his or her skills using these standards, master the skills he or she doesn't yet have, and document the skills for current or future employment.

Educators and Trainers

The scenario component is designed to convey contextual information to educators. It describes the abatement process and how a worker must use the workplace basic skills and knowledge that schools teach. Furthermore, information contained in the specific WSKAs enables educators to evaluate their curriculum, design instructional material, and build tests around measurable performance criteria and necessary work-based content.

Information contained in the conventional industry standards component will assist industry trainers in designing valid performance assessment tools. The key task component informs trainers of the most important tasks their trainees are expected to perform. This information enables trainers to design applicable, hands-on manipulative training exercises. When lessons and training strategies are designed around these standards, the schools and training facilities have a valid set of goals and objectives, measurable performance indicators, task lists, and necessary WSKAs to develop classroom and hands-on exercises. The resulting training process enables facility administrators to promote the credibility of their programs within the community, the industry, and with accreditation agencies.

"Our coalition designed the WSKAs to contain a context, a content, and performance levels. These skill indicators enable educators to easily adapt their curriculum to include examples and assessments."

Carl Horstrup, Department Chair, Industrial Technology Program
Lane Community College

The skill standards will help educators devise appropriate programs by providing educators, employers, and employees a common language for talking about skill needs and training goals. The result is strengthened relationships between workers, educators, and employers, as well as schools that will be capable of providing better preparation and career advice to prospective abatement workers.

Employers

An unskilled worker on the job can cost a contractor in many ways, such as delaying the progress of the job, creating penalties for the contractor, causing accidents that lead to increased worker compensation costs and public safety hazards, and making errors that may result in loss of profit.

A skilled work force is one of the most important ingredients to a contractor's success, which is why skill standards are so beneficial.

A contractor with a team of highly skilled workers can develop a strong reputation and an important element with which to market the company. Additionally, when a contractor needs additional workers, he or she can request a worker with specific identified skills and be guaranteed the worker knows the job.

"A contractor's survival and profitability is determined in large part by the efficiency and effectiveness of the work force. Ensuring that workers' skills fit the needs of the job site is a bottom-line economic necessity."

John Heffner, Executive Director
Training and Educational Services
Associated General Contractors of America

Employers also will benefit by ensuring that revenue contributed to joint labor/management training funds will be used for training occupational skills versus academic skills, which will be addressed by schools that adopt the standards.

All employers involved in training can, through this document, have access to the industry's best skills data and training strategies. Contractors will be able to use the standards information to restructure work assignments so as to enable a high-performance workplace.

However, in order for any employer (contractor or otherwise) to experience these benefits, everyone must do their part. An employer's most vital role is to encourage the use of these skill standards by supporting their implementation in local schools and training funds, and by requesting workers who have demonstrated they possess these skills through training or job experience.

"We can achieve success only if employers, employees, educators, and communities across North America want this to succeed."

James R. Houghton,
National Skill Standards Board
Chairman and Retired Chairman
and Chief Executive Officer
Corning Corporation

Summary

Skill standards provide benefits to all stakeholders by emphasizing quality production and safe work environments, as well as ensuring lifelong learning and earning for workers. They also improve the industry image, which attracts workers, increases confidence in products in the broader community, and improves profit margins by ensuring quality, improving skills, and boosting efficiency of workers at all levels.

The standards are designed to be used by all stakeholders in the lead abatement industry. Stakeholders include:

- *Workers* who seek lifelong employment in the hazardous material abatement industry.
- *Labor leaders* who work together with their signatory contractors to staff the most important health and safety projects in history.
- *Employers* who strive to remain competitive in an increasingly global marketplace.
- *Educators and trainers* who need accurate descriptions of the work to teach the basic skills to perform it.
- *Project owners* who must choose among competing contractors.
- *Members of the general public* who deserve environmentally safe and healthy homes and workplaces.

Lead Abatement Worker Skill Standards

The Lead Abatement Worker Skill Standards follow.

PERSONAL PREPARATION AND DECONTAMINATION

SCENARIO

Lead abatement work is a highly regulated industry requiring employers to develop, implement, and monitor written worker safety and health programs. Program issues such as exposure monitoring, administrative controls, engineering controls, hygiene practices, respiratory protection, personal protective equipment (PPE), and others are necessary to maintain a safe and healthful environment for workers. It is the worker's responsibility to actively participate and be aware of the many different program requirements in order for the objectives to be realized on all lead abatement projects.

The determination of a worker's exposure to lead aerosols and other contaminants is accomplished by personal air monitoring. A number of workers representing each job classification are selected for monitoring. The intent is to establish an average exposure level for individuals performing each job task in each work area. Personal air sampling is representative of all workers in that work area performing similar tasks.

Under the supervision of a certified industrial hygienist, workers fitted with personal air monitors are involved in the calibration and operation of the instrument, noting its flow rate at starting time and stopping time. They must also check the units periodically to ensure they are functioning properly.

Lead exposure can be controlled by rotating workers in and out of the work area. This administrative control requires documentation recording the identity of the workers in the area, the length of time they were in the area, their exposure levels, and the activities they engaged in. Workers often complete forms and provide other information to assist the employer in maintaining the proper exposure documentation.

Personal hygiene is an important practice workers use to limit the potential for lead exposure. Regulations require the setup, maintenance, and use of hand washing and/or shower facilities on abatement projects. Workers remove lead contamination from their face and hands (at a minimum), or whole body (in a shower) to limit the potential for lead ingestion on or away from the job site. Laborers set up, maintain, and stock the items necessary for a proper decontamination facility. Additionally, workers must utilize the facility properly and thoroughly so to maintain the lowest exposure to lead as possible.

Conventional Industry Standards

1) All work clothing including protective suits (coveralls), gloves, and boots are to remain at the job site and may not be worn home.
2) Eating, drinking, and smoking may not be performed in the work area.
3) Hygiene facilities such as hand and face washing stations and shower facilities must be used by workers prior to eating, drinking, or smoking and at the end of each shift.
4) Personal air monitors are to be worn so that the collection cassette is within the breathing zone of the worker, with the bottom of the collection cassette positioned away from the wearer's body at a 45° angle.
5) Clean eating areas are established when worker exposure is at or above the permissible exposure level (PEL) for lead aerosols (50 $\mu g/m^3$).
6) Proper procedure requires personal air monitors to be calibrated prior to and after each use.
7) Personal decontamination areas, such as shower rooms or hand washing facilities must established and maintained according to applicable Occupational Safety and Health Administration (OSHA) regulations.

Key Tasks

1) Don protective work clothing at the start of each shift where workers are exposed to lead at or above the PEL.
2) Maintain areas such as dressing facilities and break and lunch areas free from lead contamination.
3) Air monitoring equipment worn by workers is calibrated, started, and stopped as directed by the Industrial Hygienist (IH) on the job site.
4) Ensure that the position of the collection cassette is located within the breathing zone, and the open end of the collection cassette is pointed down at a 45° angle.
5) Fill out documentation with name, social security (or other appropriate identification number), date, and other required information when the employer is employing an administrative control, such as employee rotation to control worker exposure to lead aerosols.
6) Perform decontamination procedures prior to eating, drinking, or smoking and at the end of each shift.

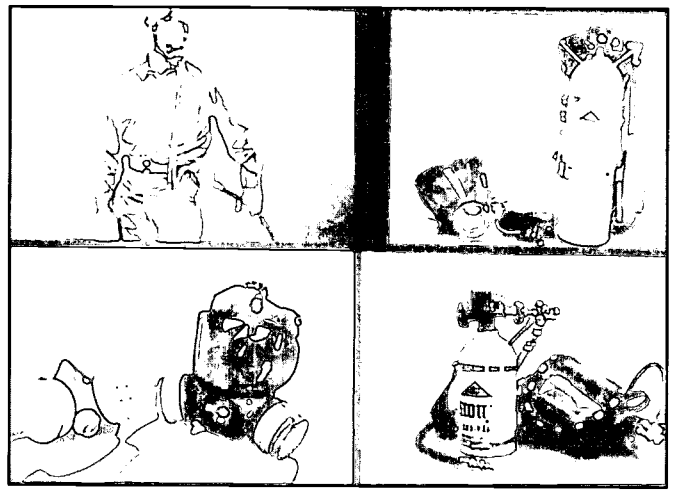
Workplace Skills, Knowledge, and Aptitudes

1) Complete forms and records on air sampling and exposure.
2) Demonstrate manual dexterity.
3) Use proper PPE.
4) Wear proper respirator.
5) Read sampling units of measures.
6) Read gauges and instruments.
7) Comprehend and follow sequential steps.
8) Calculate volumes of various shapes.
9) Know and follow decon procedures.

WORKER PROTECTION AND PERSONAL PROTECTIVE EQUIPMENT

SCENARIO

Construction activities associated with the disturbance of lead-based paint in residential buildings and steel structures require workers be provided with personal protective equipment (PPE) including respiratory protection. PPE for lead abatement workers is not only directed at exposure to lead aerosols, but also other safety and health issues, such as exposure to chemicals, heights, and noise.



Typical PPE includes disposable or reusable coveralls, gloves, hard hats, safety shoes, disposable shoe covers, chemical-resistant clothing, safety glasses (or goggles), face shields, hearing protection, and fall protection. Workers must understand fully the use, limitations, and routine inspection requirements of the PPE provided so that work activities can be performed safely and efficiently.

Respiratory protection provided to workers is either of the air purifying or supplied air categories depending upon the airborne concentration of lead aerosol and level of exposure to other airborne contaminants. Workers wearing respirators must be knowledgeable in their use and limitations, perform routine inspection, fit checking, and cleaning (disinfecting) procedures. They must also know how to store the respirator properly after use.

On lead abatement projects, respirators are assigned according to measured results from personal air sampling or presumed exposure from categorized tasks for lead. (OSHA has presumed exposure task categories.) Respirators are assigned according to their maximum use concentration (MUC) limits. Workers investigate the respirator assigned to them to ensure it will protect them from the presumed or monitored exposure levels.

Another form of worker protection used on some residential lead abatement and structural steel renovation projects is a containment enclosure under negative pressure. This important engineering control consists of a HEPA-filtered exhaust fan. The negative pressure created by the constant air exhaust prevents contamination from leaving the containment structure. Lead abatement workers are often required to install, operate, and maintain negative air systems that completely exchange the air in the contained area 10 times per hour.

Conventional Industry Standards

1) Exposure to airborne concentrations of lead dust, fumes, or mist is below the PEL (50 µg/m³) based upon an 8-hour time weighted average.
2) Exposure to other hazards, such as noise, chemicals, falls, being struck by, confined spaces must all be addressed. OSHA standards for each hazard must be followed.
3) Respiratory protection and personal protective equipment must follow standards established by OSHA. The standards include a written program that includes written operating procedures for the selection and use of respirators, instruction and training on the proper use and limitations of respirators, regular cleaning and disinfecting of respirators, proper storage procedures, routine inspection and repair of respirators, monitoring of work area to establish if conditions have changed, and periodic evaluation of the program to determine its effectiveness.
4) Containment systems requiring negative pressure engineering control, normally require a complete air exchange 10 times per hour.

Key Tasks

1) Perform proper inspection of all respiratory protective equipment prior to donning.
2) Read posted exposure monitoring levels and relate personal exposure to the protection factor of the assigned respirator being worn.
3) Perform proper positive and negative pressure fit check for all air purifying respirators each time it is donned.
4) Set up and install ventilation equipment as per the manufacturer's and contract specifications.
5) All protective equipment must be inspected for damage and repaired/replaced before entering the work area.
6) Protective clothing is removed only in change rooms.
7) Contaminated protective clothing is not shaken to remove lead contamination; it is removed off with a HEPA vacuum.
8) Protective clothing being disposed of is placed in properly labeled storage containers.
9) Protective equipment not in use is not left in the work area because of the risk of contaminating the equipment and thus the wearer.
10) Respirators are properly stored in an area free from lead contamination and not hung up by the straps.

Workplace Skills, Knowledge, and Aptitudes

1) Use and convert between common measurement systems.
2) Calculate volumes.
3) Comprehend and follow sequential steps
4) Use appropriate PPE.
5) Inspect, don, doff, and clean all types of PPE and respirators.
6) Deal with temperature extremes.
7) Demonstrate stamina to work in PPE.
8) Practice sound electrical procedures.
9) Read gauges and instruments.

RESIDENTIAL CONTAINMENT

SCENARIO

If abatement does not break or disturb lead painted surfaces, containment measures are used only as needed to protect surfaces, furniture, and residents possessions from contamination. If the lead abatement requires the breaking or disturbing of leaded surfaces, the lead dust, chips or other potential contamination are contained in the work area by constructing a containment area. Materials commonly used in containment construction include 6 mil plastic sheeting, duct tape, staple guns, spray glue, assorted lumber, nails, PVC (polyvinyl chloride) plastic pipe, and PVC cement. Containment construction begins after all movable objects have been cleaned and removed from the work area.

Plastic sheets are used to cover all non-movable objects, such as radiators, refrigerators, large pieces of furniture, shelves, and cabinets. A high efficiency particulate air (HEPA) vacuum is used to remove debris that can tear or puncture the plastic sheeting. Then the sheeting is fastened securely with duct tape and/or staples, taking care to minimize damage to surfaces.

Work areas are sealed off from non-work areas at all doorways and windows. Effective barriers at doorways are constructed by using two layers of plastic sheeting. Windows are sealed by sheets of plastic cut larger than the window and fastened to the wall with duct tape, spray glue, staples or furring strips, and nails. Plastic sheeting is installed on the outside of the building covering the entire window in the following instances: the window is abated in place; the window is removed and replaced with non-lead painted components; or the window is removed, stripped off site, and reinstalled.

The aerodynamics of leaded dust particles and the most common methods of residential lead abatement are such that the use of HEPA-filtered negative air machines are often unnecessary. However, if the abatement method will produce a large quantity of dust (such as floor sanding or open abrasive blasting), the installation of negative pressure equipment is necessary. All exhausted air must pass through a HEPA filter and be delivered outside the building. Containment structures for removal activities in common areas (such as a hallway) that must allow residents and others safe passage through the building are constructed out of a 2x4 frame covered with plastic sheeting.

Abatement activities on exterior components of a residential building are contained by placing plastic sheeting on the ground along the building's foundation. The containment is extended a minimum of 8' out from the foundation to a maximum of 20'. All shrubs, fences, and ground cover must be protected when performing outside lead abatement. Temporary fencing or barrier tape is erected at a 20-foot perimeter around working surfaces. Warning signs are posted at the 20-foot perimeter around the building. If wind speed exceeds 15 miles per hour (mph), or there is visible movement of debris beyond the ground sheeting, vertical shrouds are erected at the ends of the building. The shrouds are constructed of 6 mil polyethylene sheeting or tarpaulins that extend 3' to 4' from the sides of the building. Windows and other penetrations into the building are also sealed from the outside of the building with 6 mil polyethylene sheeting and duct tape.

If outside abatement activities include the exterior window components, then windows are sealed with plastic sheeting and duct tape on the inside of the building. One layer of plastic sheeting is placed on the ground extending 5 feet beyond the perimeter of the window being treated/replaced. Additionally, if outside abatement activities disturb the lead-based paint, and there is a potential for an adjacent residence to become contaminated with air borne debris, the outside windows and other penetrations of the adjoining structure are sealed with 6 mil polyethylene sheeting and duct tape.

Conventional Industry Standards

1) Structural integrity of containment systems must be capable of remaining in place during abatement activities, changes in temperature and humidity, and strong winds.
2) Consideration is given to the type of materials used in containment construction to minimize the damage to dwelling unit components.
3) Containment areas are installed so there are no emissions beyond the barrier.
4) HEPA-filtered, negative air machines are installed in sufficient quantity to produce 10 air changes per hour.
5) Abatement methods disturbing less than 2 square feet (ft^2) of painted surface per room require only a single layer of plastic on the floor extending 5' beyond the perimeter of the treated area in all directions.
6) Abatement methods disturbing more than 10 ft^2 of painted surface per room require two layers of plastic sheeting on the entire floor.
7) If the entire unit is being abated, then individual doorways need not be sealed.
8) If only a few rooms are being abated then all doorways are sealed using two layer plastic barriers.
9) Ladders are not placed directly on plastic outside ground covering. Ladder feet are placed on boards so they do not puncture the plastic.
10) Exterior abatement activities are not conducted when wind speeds exceed 20 mph. Work must stop and cleanup must occur before rain begins.

Key Tasks

1) Decide on type of containment necessary to control the spread of lead contamination to non-work areas.
2) Pre-clean work area of all debris with HEPA vacuum.
3) Clean and remove all moveable items, such as furniture, chairs, tables, and beds.
4) Correct structural deficiencies that will impede containment construction and abatement operations.
5) Choose proper materials to construct the containment.
6) Weight poly sheeting, or otherwise secure, to prevent being blown away.
7) For outside abatement, erect vertical shrouds when wind speed exceed 15 mph.
8) Erect scaffolding to construct containment and conduct abatement activities.
9) OSHA's scaffolding standard must be complied with.
10) Raise the sides of ground polyethylene sheeting to contain water and lead debris during abatement.

Workplace Skills, Knowledge, and Aptitudes

1) Use and convert between common measurement systems.
2) Calculate areas of various shapes.
3) Calculate volumes of various shapes.
4) Lift and move heavy objects.
5) Demonstrate manual dexterity.
6) Work in areas of constricted movement.
7) Use appropriate PPE.
8) Wear proper respirator.
9) Set up warning signs and barricades.
10) Set up and use containment systems.
11) Inspect scaffolding before working on platform.
12) Identify and know procedures to adapt to and control environmental hazards.
13) Set up and use fall protection.

RESIDENTIAL ABATEMENT: COMPONENT REMOVAL AND PAINT STRIPPING

SCENARIO

The permanent removal of lead-based paint in residential housing is the most invasive of all lead hazard control options. The disturbance of leaded paint creates large quantities of dust and debris that, if not properly controlled, will create an even greater hazard. The two most common methods of residential lead-based paint abatement are the complete removal of building components and the stripping of lead-based paint from painted surfaces.

Removal and replacement of building components allow the building owner to upgrade the property while totally eliminating the lead hazard. Building components normally removed and replaced include built-in furniture, cabinets, doors, and trim. After properly preparing the work area (building containment), the removal starts by scoring the painted surfaces with a sharp utility knife at the point of contact between the building component and the wall surface. Care is taken to avoid damage to adjacent surfaces with tools such as pry bars, hammers, or screw drivers. A light water spray at the edges of the painted component during removal minimizes the generation of lead dust. Once removed, the building components are sealed in plastic sheeting with duct tape and properly disposed of or are delivered to an off-site paint stripping service.

Normally the process of stripping lead-based paint involves a chemical stripper and three steps:

1. Apply the chemical using a taping or putty knife.
2. Allow time for the chemical to set.
3. Scrape and place the contaminated waste in an impervious container.

Since any remaining paint may leach out after a new paint coating is applied, the stripping must be complete. Some chemical stripping products require a neutralizing agent to stop the chemical stripping action. Lead abatement workers must know the different types of chemical strippers, their characteristics and hazards.

Other methods of lead-based paint abatement methods include a heat gun, mechanical equipment equipped with a HEPA dust collection systems (such as orbital palm sanders, and grinders), vacuum blasting (for steel or masonry components), and wet scraping. Although each of these additional methods are viable, they are most often used in conjunction with the building component removal and replacement and chemical stripping methods.

Conventional Industry Standards

1) Removal of lead-based paint from surfaces is performed so that wipe sampling results are less than 100 µg/ft² for floors, 500 µg/ft² for interior window sills, and 800 µg/ft² for window troughs and exterior concrete or other rough surfaces.
2) Contaminated waste is properly labeled and stored in a secure area prior to testing and disposal.
3) Production rates vary for method used, thickness of paint layers, age of paint, and surface(s) being abated.
4) Housekeeping activities are conducted daily within the work area.
5) Abatement method should be capable of lasting twenty years.
6) Lead-based paint abatement is not conducted using open flame burning, machine sanding without a HEPA dust collection system, open abrasive blasting, heat guns operating above 1,100°F, chemicals containing methylene chloride (a suspected carcinogen), or dry scraping (except for limited surface areas).
7) The work area is appropriately contained based on the method of abatement used, areas to be abated, and location of building residents.

Key Tasks

1) Repair all structurally deficient components prior to abatement.
2) HEPA vacuum all surfaces prior to applying poly sheeting.
3) Measure and cut materials or components.
4) Gather all tools for the removal of building components.
5) For building component removal, lightly mist component prior to removal. Score all painted seams and remove all fasteners (nails or screws). Use a flat pry bar (or equivalent) to remove component from substrate. Wrap and seal all removed components in 6 mil poly and duct tape. Perform housekeeping by HEPA vacuuming all dust and paint chips in the area of the removed component.
6) If heat gun(s) are used, place the appropriate fire extinguisher in the work area.

Workplace Skills, Knowledge, and Aptitudes

1) Lift and move heavy objects.
2) Demonstrate manual dexterity and hand-eye coordination.
3) Work in areas of constricted movement.
4) Calculate areas of various shapes.
5) Use and convert between standard measurement systems.
6) Read and interpret material safety data sheets.
7) Use appropriate PPE.
8) Wear proper respirator.
9) Comprehend and follow sequential steps.
10) Practice sound electrical safety procedures.
11) Deal with temperature extremes.
12) Identify and know procedures to adapt to and control environmental hazards.
13) Set up and use fall protection equipment.
14) Inspect scaffold before working on platform.
15) Read gauges, meters, and instruments.
16) Keep fire extinguisher available and know how to use it.

RESIDENTIAL ABATEMENT: ENCLOSURE AND ENCAPSULATION

SCENARIO

Enclosure is the installation of a rigid, durable barrier that is mechanically attached to building components, with all edges and seams sealed to provide a dust-tight barrier and prevent access and exposure to lead-based painted surfaces underneath. Enclosure is performed on both interior and exterior surfaces utilizing a number of durable materials, such as drywall, fiberboard, wood paneling, laminated products, ridged tile, brick veneers, aluminum, or plywood.

Enclosure barriers are back-caulked at all seams and joints. Back-caulk means applying caulk to the underside and seams of the enclosure material. When installing enclosures directly to painted surfaces, such as floors, walls, or ceilings, adhesive is used to hold the material, followed by mechanical fasteners, such as nails and/or screws. When enclosure operations within a work area are completed, clean-up operations are conducted. Lead abatement workers must know the many construction techniques and products used to construct physical enclosures and be able to identify when an enclosure method is not sealed or bonded properly.

Encapsulants are coatings or rigid materials that prevent contamination by adhering directly to the lead-painted surface. Encapsulants are grouped into three categories:

1. Non-reinforced liquid coatings
2. Liquid coatings reinforced with cloth or fiber mats
3. Materials (such as fibermat or vinyl floor tile) bonded to the substrate with an adhesive.

Prior to applying an encapsulating material to a surface, a proper containment for the work area is constructed. The wide variety of encapsulating materials available, substrate repair or preparation prior to installation, application method, and the need to protect other surfaces from the encapsulating material and/or bonding agent are considered when constructing a containment for the work area.

After the work area has been contained, dirt, grease, mildew, remnants of cleaning solutions, and loose paint are removed from all surfaces. If volatile chemicals or solvents are used in the removal of surface contaminants or application of encapsulant, the work area is ventilated. Upon completion of the encapsulation process, clean-up procedures are implemented. Lead abatement workers must know the properties of the many different types of chemical encapsulants. In addition, they must know how to recognize when an encapsulant is not bonding properly to the surface.

Conventional Industry Standards

1) Encapsulating and enclosure materials must be capable of lasting 20 years under typical conditions.
2) Application or installation of encapsulating materials must be performed following the manufacturer's specifications for temperature, humidity, coating thickness (for liquid coatings), and method of application.
3) All unsound substrates and structural members that will not support the finished enclosure must be repaired prior to enclosure or encapsulation.
4) Prior to enclosing a floor, it must be HEPA vacuumed to remove any small debris that will create lumps in the enclosure material being installed.

Key Tasks

1) Repair all structurally deficient components prior to enclosure or encapsulation.
2) HEPA vacuum all surfaces prior to containment.
3) Prior to encapsulating, prepare surfaces by removing all dirt, grease, chalking paint, mildew and other surface contaminants.
4) Read and follow manufacturer's instructions for applying the encapsulant.
5) Measure, mix, and cut materials or components.
6) Gather all tools necessary for the installation of an enclosure or the application of encapsulant.
7) Install extension boxes for all electrical switches and outlets that penetrate the enclosure.
8) Seal and back-caulk all seams and joints of enclosure.
9) Perform daily housekeeping by removing accumulated debris and HEPA vacuuming all surfaces.

Workplace Skills, Knowledge, and Aptitudes

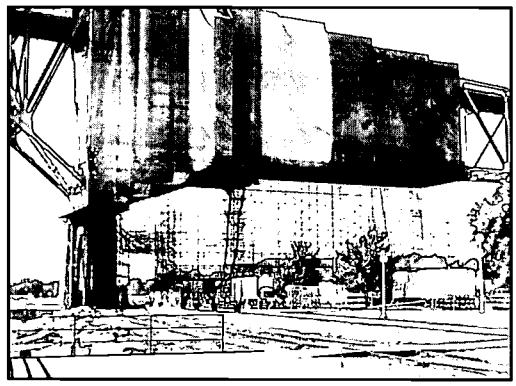
1) Wear proper respirators.
2) Comprehend and follow sequential steps.
3) Work in areas of constricted movement.
4) Read, interpret, and use material safety data sheets.
5) Deal with temperature extremes.
6) Calculate areas of various shapes.
7) Use and convert between common measurement systems.
8) Demonstrate manual dexterity and eye-hand coordination.
9) Use appropriate PPE.
10) Practice sound electrical safety procedures.
11) Identify and know procedures to adapt to and control environmental hazards.

STRUCTURAL CONTAINMENT

SCENARIO

The repair and demolition of lead-based painted steel and concrete structures often results in worker and environmental exposures that far exceed residential abatement activities. Containment structures are used to prevent the spread of contamination to the surrounding environment and aid in controlling worker exposure. The type of abatement method used (dust generating or non-dust generating) and ventilation requirements (local exhaust, general, or natural ventilation) of the project dictate containment design. Just as there are variations in structures, there are also variations in the types of containment areas that can be applied to each structure.

Containment structures are assembled from materials such as tarpaulins, reinforced plastic sheeting, clips, cables, lumber, prefabricated inlet air and exhaust ports, Velcro stripping, outriggers, scaffolding, and duct tape. Since each project is unique, workers must know the many aspects of containment construction, including structure design, assembly requirements, and installation procedures as cited in the project specifications.



Containment structures include suspended tarpaulin, bridge-to-grade, micro containment, outrigger and cable, enclosed staging, and suspended platform. The suspended tarpaulin system consists of tarpaulins hung from horizontal cables spanning a number of piers and is used on low waste generating abrasive blasting maintenance projects. Bridge-to-grade (the term "grade" means the floor or ground) containment systems also use tarpaulins suspended from horizontal cables. This containment system is used primarily on bridges that are close to grade. The grade is also covered with tarpaulins to further contain the debris and aide cleanup activities.

Micro containment consists of a small highly mobile enclosure used for intermittent abrasive blasting of isolated areas. This type of containment may be constructed of tarpaulins or plywood.

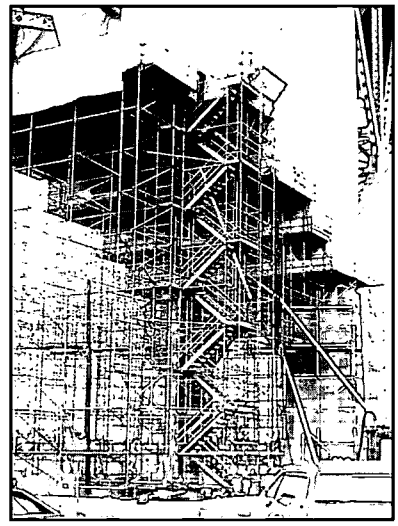
Outrigger and cable containment systems use a tarpaulin enclosure attached to a flexible cable. The cable system is supported by outriggers attached along the structure's length and width. Due to the large size of this containment structure, internal tarpaulin divider walls are used to restrict contaminant movement between other enclosed work areas.

Enclosed staging consists of a tarpaulin enclosure that is supported by staging (such as scaffolding) constructed on the structure being abated or on grade. This system is used as an independent system or with a suspended platform system.

Suspended platform containment is made of a rigid, lightweight structural assembly covered by plywood. The platform is suspended beneath the structure being abated (typically bridges) and is supported by stationary or trolley type beam clamps. Large containment areas are often subdivided with interior divider walls to prevent the spread of contamination to other work areas within the containment.

Conventional Industry Standards

1) Construction and installation of a containment structure must be of high quality to withstand environmental factors, such as strong winds, extremes in temperature, rain, and snow.
2) The structure must be installed so that lead contamination does not escape beyond the work area.
3) The speed of construction for a containment system is dependent upon the type of containment installed, the structure to which the containment is being installed, the use of mechanical fasteners, and the proximity of other structures, waterways, residences, and occupied areas.
4) Assembly details for sealing seams and joints and attaching containment materials to the support system must be closely followed.



Key Tasks

1) Perform traffic control if containment is erected on an active roadway or bridge.
2) Assemble tools and materials, moving and storing by whatever means appropriate.
3) Inspect and adjust scaffolding or staging, working surfaces, and fall protection equipment.
4) Measure and cut materials or components.
5) Install and use proper fall protection during containment construction as needed.
6) Use hand tools, such as hammers, wrenches, tape measures, wire cutters, and pry bars, properly.
7) Operate a man lift in a limited area in a safe manner.
8) Rig loads prior to hoisting.
9) Perform approved hand signals to mechanically move loads.

Workplace Skills, Knowledge, and Aptitudes

1) Perform traffic control duties.
2) Set up and use fall protection equipment.
3) Inspect scaffolding before working on platform.
4) Lift and move heavy objects.
5) Calculate areas of various shapes.
6) Use and convert between various measurement systems.
7) Prepare, rig, and inspect loads.
8) Use proper hand signals.
9) Use appropriate PPE.
10) Wear proper respirator.
11) Identify and know procedures to adapt to and control environmental hazards.
12) Comprehend and follow sequential steps.
13) Deal with temperature extremes.
14) Practice sound electrical safety procedures.

STRUCTURAL ABATEMENT

SCENARIO

Removal of lead-based paint is required prior to the maintenance, repair, and demolition of steel structures, such as bridges, tanks, transmission towers, and commercial superstructures. The amount of lead-based paint removed depends on the activity. For example, if the structure is being demolished or dismantled, small areas of paint are removed at the locations of the proposed cuts. Renovation activities, where new steel is being welded, also require the removal of small areas of paint.

Maintenance activities, such as repainting a steel structure, normally require the removal of large quantities of old leaded paint, rust, and mill scale. The conditions of each project dictate the method of paint removal. Common methods include hand tool cleaning, power tool cleaning, chemical stripping, abrasive blast cleaning, and water jetting.

Hand tool cleaning is the most basic method of removing leaded paint from steel structures. Tools such as wire brushes, putty knives, scrapers, sand paper, slag and chipping hammers are commonly used. Because of low dust generation, tarps or screens are used to isolate the work area and capture the debris.

Power tool cleaning may be conducted with or without a (HEPA) dust collection system. Tools used typically include power chippers, needle guns, sanding disks, and grinding wheels. These tools may be powered electrically, pneumatically, or electro-pneumatically. Power tool selection dictates the configuration of the containment structure required. Low dust generating tools equipped with a HEPA dust collection system require a less stringent containment than a similar tool without dust collection capabilities.

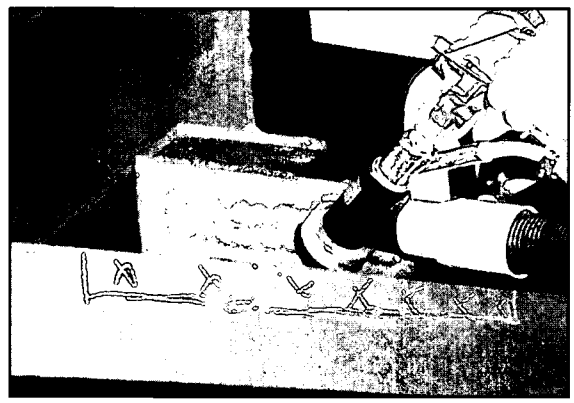
Chemical strippers for steel structures are available in a variety of formulas for different types of coatings. Application procedures are recommended by the manufacturer and must be followed closely. Typically, special containment structures are not required, but a means for capturing and containing removed material and water used in any flushing or scrubbing of the surface must be in place.

Abrasive blast cleaning is perhaps the most common method of removing coatings from steel structures. This technique includes four subcategories: (1) open abrasive blast cleaning with expendable abrasives, (2) open abrasive blasting with recyclable abrasives, and (3) closed abrasive blasting with HEPA vacuum, and (4) wet abrasive blast cleaning. In all instances, abrasive blasting is the process of using compressed air to propel abrasive particles against the surface to be cleaned. The major differences between the four types mentioned are whether the abrasive is expended, recycled, and/or reused, and whether the operation is performed as an open (without dust collection) or closed (with dust collection) procedure.

Water jetting is the use of pressurized water. Pressurized water, from 20,000 pounds per square inch (psi) to 40,000 psi, is directed at a surface to remove lead-based paint and other coatings. Methods include high pressure water jetting, high pressure water jetting with abrasive injection (metered abrasive), ultra high pressure water jetting (40,000 psi), and ultra high pressure water jetting with abrasive injection (metered abrasive). Because each is a wet method and therefore produces low dust generation, containment structures do not have to be airtight yet they must be capable of containing the water used in the process, as well as collecting the paint debris, abrasive (if used), and rust and mill scale.

Conventional Industry Standards

1) Removal of lead-based paint on steel surfaces is performed so as to obtain the proper surface preparation (profile) if the surface is to be recoated.
2) Removal of lead-based paint in areas where existing steel is to be torch cut or new steel welded requires removal of paint a minimum of 6" beyond the area to be cut or welded.
3) Production rates vary for method used, thickness of paint layers, age of paint, and surface(s) being abated.



Key Tasks

1) Prepare appropriate containment structure for the work method(s) to be used.
2) Don the appropriate PPE for the anticipated hazards, including, chemical, noise, hearing, and dust and fumes.
3) Position ventilation equipment as close to source of contaminant as possible.
4) Maintain a clean work area during abatement operations by HEPA vacuuming frequently.
5) Install and use fall protection devices as necessary.
6) Read and follow manufacturer's specifications when using a chemical stripper to remove lead-based paint.
7) Wear the appropriate chemical protective clothing appropriate for the chemical compounds being used.
8) For abrasive blasting methods, set up air compressor, blasting pot, air and abrasive delivery hoses, and recovery unit (if used).
9) For high pressure water jetting, set up specialized pump, lance, and nozzle assembly; locate and connect large volume water supply; run hoses and supply lines; connect abrasive induction unit (if used); and add proper quantity of rust inhibitor to water holding unit.
10) If abatement is performed at heights, set up scaffolding, ladders, and man lifts as needed following manufacturer's specifications and OSHA regulations.

Workplace Skills, Knowledge, and Aptitudes

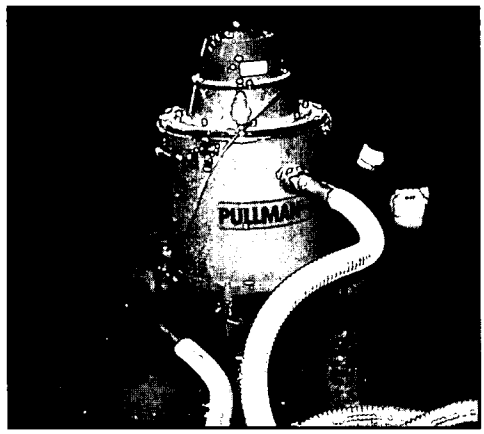
1) Lift and move heavy objects.
2) Demonstrate manual dexterity and eye-hand coordination.
3) Work in areas of constricted movement.
4) Read and interpret material safety data sheets.
5) Use appropriate PPE.
6) Wear proper respirator.
7) Practice sound electrical safety procedures.
8) Set up and use fall protection equipment.
9) Inspect scaffold before working on platform.
10) Read gauges and instruments.
11) Deal with temperature extremes.
12) Rig loads.
13) Use proper hand signals.
14) Work effectively as member of the team.

CLEANUP

SCENARIO

Regardless of the type of lead abatement conducted (residential or structural steel), all projects have to be maintained free of lead dust, debris, and contamination. This requires daily cleanup of the work area, as well as final clean-up procedures.

Clean-up activities associated with structural steel lead abatement are less stringent than for residential buildings because people do not dwell in steel structures. For steel structures, daily clean-up (housekeeping) activities are conducted primarily by HEPA vacuuming all horizontal surfaces on a daily basis. Dry or wet sweeping, shoveling, or brushing may not be used except where HEPA vacuuming methods have been attempted but failed to work. Blowing surfaces with compressed air is generally prohibited as a cleaning method, unless the compressed air is used in conjunction with a ventilation system designed to capture the airborne dust created by the compressed air.



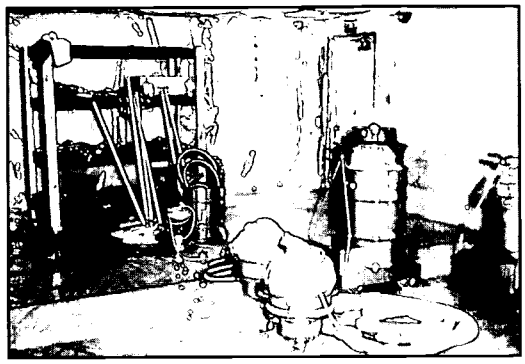
Residential lead abatement clean-up efforts are more detailed due to the possibility of resident exposure upon reoccupation of the dwelling unit. As with structural steel, the preferred method of cleanup is the HEPA exhausted vacuum. Daily cleanup is necessary and includes HEPA vacuuming of all horizontal surfaces, bagging and removing lead contaminated debris, and wrapping and sealing all demolished debris (such as doors or windows).

The final cleanup for clearance testing is highly detailed. Even the smallest dust particles containing lead must be removed from the work area. Tools used in final cleanup include HEPA vacuum and attachments (crevice tools, beater bar, dust brush), lead attracting detergent, such as trisodium phosphate (TSP), waterproof gloves, rags, sponges, mops, buckets, 6 mil polyethylene disposal bags and sheeting, debris containers, waste water containers, and water misting sprayers.

Begin final cleanup no sooner than one hour after the last abatement procedure is completed. HEPA vacuum all surfaces in the work area starting with the ceiling, moving next to the walls, and finally the floors. Cleanup always progresses from the point furthest from the work area entrance. The next step is to wash all surfaces with a TSP and water solution. The washing procedure follows the same steps as the HEPA vacuuming procedure.

After the area is completely dry, the room is entirely HEPA vacuumed again following the same procedure as the first vacuuming. At this point, clearance testing of surfaces (wipe sampling) is conducted. The final clean-up procedures are considered successful if the area passes all clearance testing. If unsuccessful, the HEPA vacuum, TSP wash, and HEPA vacuum procedure is repeated for all similar surfaces not passing clearance testing. This process is repeated until successful final clearance tests have been obtained for all surfaces. After passing final clearance testing, the work area is then repainted, new wall paper is hung, new carpeting is laid, and doors and cabinets are replaced. The work area is then tested again to ensure that it is safe for reoccupancy.

Conventional Industry Standards



1) For residential buildings, abatement is considered complete when lead dust test results do not exceed 100 µg/ft² for floors, 500 µg/ft² for interior window sills, and 800 µg/ft² for window troughs and exterior concrete or other rough surfaces.
2) Steel structures require proper surface preparation for recoating.
3) No visual dust is to be observed in the work area upon completion of abatement and prior to repainting or recoating, replacement of building components, and installation of encapsulating or enclosing materials.
4) The use of compressed air for cleaning surfaces is prohibited unless there is an effective containment and ventilation unit installed. The preferred method for cleaning is the HEPA vacuum.

Key Tasks

1) Use HEPA vacuum to clean all surfaces of lead accumulation. (Do not dry sweep or use compressed air.)
2) Allow proper amount of settling time before beginning final cleanup.
3) For residential abatement, always perform the following steps for final cleanup: HEPA vacuum, TSP wash, then HEPA vacuum.
4) For steel structures, if a chemical abatement method is used, neutralize the chemical as recommended by the manufacturer.
5) For residential abatement, containment is removed by folding the 6 mil poly sheets into themselves and placing in a proper disposal container.
6) TSP or other lead-attracting agent is mixed in the proper ratios as stated in the manufacturer's specifications.

Workplace Skills, Knowledge, and Aptitudes

1) Lift and move heavy objects.
2) Demonstrate manual dexterity and eye-hand coordination.
3) Work in areas of constricted movement.
4) Read and interpret material safety data sheets.
5) Use appropriate PPE.
6) Wear proper respirator.
7) Use and convert between various measurement systems.
8) Set up and use fall protection equipment.
9) Inspect scaffolding before working on platform.
10) Read meters, gauges, and instruments.
11) Deal with temperature extremes.
12) Rig and move loads.
13) Use proper hand signals.

Workplace Skills, Knowledge, and Aptitudes

Organization of the WSKAs

The following Workplace Skills, Knowledge, and Aptitudes (WSKAs) are comprehensive descriptions of the skills, knowledge and aptitudes required to perform the job duties of a lead abatement worker. They are arranged in the following categories:

Aptitudes and Abilities
Workplace Basic Skills
Cross-Functional Skills
Occupational Specific Knowledge

The above arrangement allows the reader to identify quickly the group of WSKAs most applicable to their purpose. For example, if the reader is a secondary or post-secondary teacher, he or she might be most interested in comparing the content of their curriculum with the minimum job skills required of a prospective lead abatement worker. Therefore, he or she might focus on the use of the academic disciplines as described in the section containing workplace basic skills. If the reader is an occupational specific trainer, he or she might find the WSKAs described in the sections containing cross-functional skills and occupational specific knowledge more helpful.

Regardless of the specific use, the reader should review all of the WSKAs to obtain a more complete picture of the academic and psychomotor skills, knowledge, and aptitudes required of a worker to work successfully in the lead abatement industry.

Elements of a WSKA

Each WSKA contains the following elements:

- context
- mastery performance level
- content
- references to job functions to which the WSKA applies
- references to the key tasks and activities in which the WSKA is included.

The context element describes when and under what circumstances a lead abatement worker applies the WSKA and provides examples of work processes using that skill, knowledge, and/or aptitude.

The mastery performance element identifies how well the WSKA must be performed. The information is useful both to judge priority and as performance criteria for assessment.

The content element describes teaching exercises and identifies performance demonstrations that will ensure competency.

The reference elements identify the job function and key tasks and activities to which a particular WSKA pertains.

APTITUDES AND ABILITIES

LIFT AND MOVE HEAVY OBJECTS

Context

Lead abatement is physical, heavy work. It involves lifting, moving, and placing heavy objects and materials. Weight usually exceeds 50 lbs (23 kg) and often exceeds 90 lbs (41 kg). Among the work that involves lifting and moving heavy objects are tasks such as: (a) assembling and disassembling scaffolding, (b) removing building components, and (c) loading and unloading abrasive materials.

Mastery Performance

1. Workers will explain the correct steps for lifting and moving heavy objects.
2. Given a load, a worker will lift and move the load correctly using each step.
3. Given an example of someone else lifting and moving a heavy load, the worker will point out errors/problems in the technique and suggest how to correct it.
4. Workers will smoothly lift, balance, and carry three 2" (50 mm) by 4" (100 mm) by 16' (4.8 m) pieces of lumber a distance of 50' (or 15 m) and set them down on dunnage.
5. Workers will move couplings, fittings, and tools without incurring damage to the materials.

Content

Method One

1. Size up a load (weight, size, and shape) to ensure you can handle it.
2. Place feet close to object and shoulder-width apart.
3. Bend at the knees and find handholds.
4. Keep your back straight (in line with hips) and tuck your chin so your head is in line with your back.
5. Lift by standing, putting the load's weight on your knees and thighs. Lift the load straight up. Keep load close to your body.
6. Turn by changing foot position and carry the load close to your body.
7. Set load down using legs to support weight.

Method Two

1. Raise bag upright.
2. Put one knee against the bag as you kneel on one knee.
3. Pull the bag up to your leg.
4. Transfer the bag to edge of the other knee.
5. Stand upright, moving the bag up to your body.
6. Carry the load close to your body.

Reference

Job Functions	**Sample Tasks and Activities**
All	Clean and remove all movable items Erect scaffolding Measure, mix, and cut materials or components

DEMONSTRATE MANUAL DEXTERITY AND EYE-HAND COORDINATION

Context

Lead abatement workers must use strength combined with manual dexterity and eye-hand coordination to perform much of the work they do. In lead abatement work, dexterity, coordination, and strength are required to: (a) hold and use hand and power tools, (b) build scaffold and containment systems, and (c) calibrate instruments.

Mastery Performance

1. Given any number of tools used in lead work, the worker will demonstrate sufficient hand strength, dexterity, and eye-hand coordination to operate the machine or use the tool correctly.
2. Given the tasks of a lead abatement worker, the worker will receive an acceptable score on a standardized test of manual dexterity, such as the Minnesota Rate of Manipulation tests or the revised Touchek/Brown eye-hand-foot coordination samples.

Content

1. Demonstrate, explain, and practice tool and equipment use to work on coordination and dexterity in mock-up situations.
2. Work with strength, flexibility, dexterity, and eye-hand exercises, including both gross and fine motor movement.

Reference

Job Functions	**Sample Tasks and Activities**
All	Erect containment areas Use hand tools and power equipment Calibrate instruments Build scaffold

WORK IN AREAS OF CONSTRICTED MOVEMENT

Context

Most work associated with lead abatement involves moving, installing materials, carrying loads, and other efforts in cramped, small areas that dramatically restrict range of motion. Lead abatement workers work inside containment areas and often on scaffolding. Examples of constricted movement include: (a) difficult footing in narrow spaces, (b) limited space for arm movement and tool use, (c) limited space to move materials, (d) limited space for access and egress, and (e) no room to move from falling materials.

Mastery Performance

1. Exhibit no signs of claustrophobia or exhibit excellent control in mock-up work situations that include restricted movement.
2. Demonstrate sufficient strength and dexterity to use tools to complete work to quality and on schedule in constricted space.

Content

1. Discuss situations and types of constricted movement in lead work.
2. Discuss problems, dangers, and strategies for dealing with work situations.
3. Demonstrate technique for some types of identified situations.
4. Practice on mock-ups that illustrate job settings. Use a variety of working surfaces and situations including at least working in narrow space, moving materials into and around in a restricted area, working in areas of restricted vertical vision, and using tools where swing and arm movement are restricted.

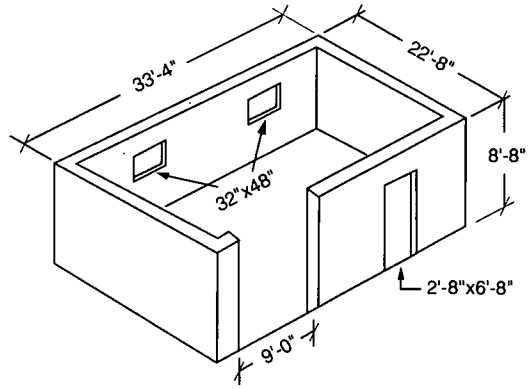
Reference

Job Functions	**Sample Tasks and Activities**
All	Use equipment on scaffolding Use equipment in containment areas

CALCULATE AREAS OF VARIOUS SHAPES

Context

Lead abatement workers must calculate area in many components of their work. Among the tasks and activities for which area calculation is used are: (a) determine the size of an area to find how much encapsulating material is needed, (b) find the space of a surface to determine how much cleaning or protective material to mix and/or apply, and (c) calculate the amount of a surface to estimate time requirements to complete tasks.



Mastery Performance

1. Given specific objects a worker will find areas from linear measurement, correct to within ±2 ft^2 or .6 m^3.
2. Given an area to abate, a worker will compute adequate liquid or spray to cover within 2 ft^2 or .6 m^3 or greater and will cover surface with appropriate materials.
3. Given an object, the worker will demonstrate how to "break" the object into manageable shapes to use formulas to find area measures.

Content

1. Demonstrate, explain, practice, and find areas of squares, rectangles, circles, cylinders, triangles, and unusual shapes; illustrate how to break objects into shapes from which one can find the area.
2. Match formulas for area calculations of object to different shapes.
3. Work with and convert square measures in both metric and U.S. Standard measure.
4. Discuss work tasks where area calculation is used.

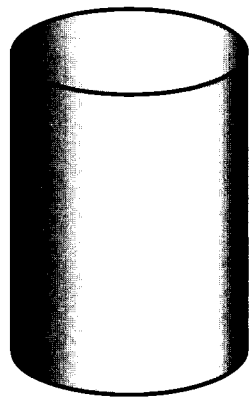
Reference

Job Functions	**Sample Tasks and Activities**
All	Determine materials needs Calculate amount of materials to mix or apply Erect containment Establish barriers

CALCULATE VOLUMES OF VARIOUS SHAPES

Context

Lead abatement workers must determine volume measures for objects of different sizes and shapes. Their work always involves sampling air and creating containment structures. Ventilation and exposure rates within containment structures are critical and involve volume calculations.



Mastery Performance

1. Given specific objects, lead abatement workers will find volumes from linear measurements. Volumes must be correct within .5 yd^3 or .4 m^3.
2. Given an object, the lead abatement worker will demonstrate how to break the object into manageable shapes to use formulas and find capacities.
3. Given volume formulas, the lead abatement worker will match the formula with the appropriate shape.

Content

1. Demonstrate, explain, practice, and find volumes of squares and rectangles.
2. Demonstrate, explain, practice, and find volumes of spheres and hemispheres.
3. Demonstrate, explain, practice, and find volumes of cylinders.
4. Demonstrate, explain, practice, and find volumes of pyramids.
5. Match formulas for volume calculation of objects to various shapes.
6. Work with and convert cubic units of measure, in both metric and U.S. Standard measure.
7. Illustrate how to break objects into shapes from which one can find volume measures.
8. Discuss work tasks where volume calculation is used.

Reference

Job Functions	**Sample Tasks and Activities**
All	Sample air Determine set-up and ventilation requirements of containment

PERFORM BASIC MATH OPERATIONS

Context

Lead abatement work includes not only hard physical labor, but also math calculations in order to answer questions that are critical to doing the work correctly. For example, lead abatement workers must calculate their dose and exposure rates by taking the information that is provided on the instrumentation that they wear or use for air sampling, and plugging it into formulas to help determine the exposure rate for the entire crew, as well as the exposure and dose rate for individual workers. In addition, basic math operations are critical for performing measurements to build containment; for calculating the amount of paint stripper or encapsulant that is necessary to perform residential abatement work; for estimating the percentage of work done or the amount of work that remains to be completed on any given project; and for calculating the appropriate engineering and ventilation controls to ensure that the contamination level is kept as low as possible.

Addition, subtraction, and multiplication are all important. However, for the lead abatement worker division also is an important skill to master.

Mastery Performance

1. Given any of a series of measurements associated with lead abatement work, the worker will correctly execute the appropriate math calculation and derive the correct answer within ± 3 units of measure at least 9 out of 10 times.
2. Given any of the measurements in lead abatement, the worker will correctly set up the equation or describe the process through which the worker can derive the correct answer to the problem

Content

1. Demonstrate how to gather the various math measurements that are used in lead abatement work.
2. Demonstrate how these numbers are used to derive other important figures.
3. Explain the different calculations and why they are important in the work and to the safety, health, and protection of the worker.
4. Practice each of the important calculations, using samples from live work.
5. Practice gathering the measurements and using the various formulas that lead abatement workers must use.
6. Ask trainees to explain and work through each of the formulas in order to derive the correct answer.

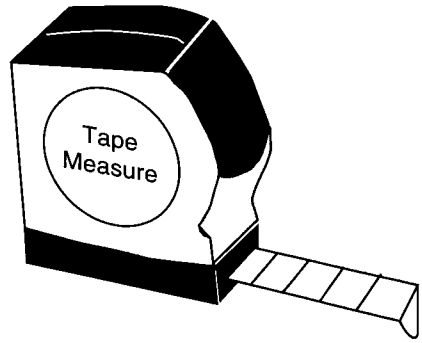
Reference:

Job Functions	***Sample Tasks and Activities***
Personal protection and decontamination	Perform air monitoring.
Worker protection and personal protective equipment	Determine exposure rates.
Residential containment	Estimate amounts of materials necessary to perform abatement.
Residential abatement; enclosure, and encapsulation	Build all types of containment areas.
Structural containment	Establish warning signs and barricades at appropriate distances.
Clean-up	

USE AND CONVERT BETWEEN COMMON MEASUREMENT SYSTEMS

Context

Lead abatement workers routinely read instruments and make measurements during their work. They also routinely mark, measure, and check distances. Measurements are used to: (a) calculate material needs, (b) build containment structures, (c) take samples, (d) determine exposure, (e) set up lighting and ventilation, and (f) calibrate instruments.



Mastery Performance

1. Given a measurement value, the worker will read the unit of measure correctly 90% of the time.
2. Given a space to measure, the worker will measure linear distance (horizontal and vertical) correctly within ± 1/8" (3 mm or .01").
3. Given a unit of measure, the worker will convert the unit to fractions, decimals, or metric measures correctly within ± 1/8" (3 mm or .01").
4. Given a measurement to transfer from one object to another, the worker will mark the distance on the object correctly within ± 1/8" (3 mm or .01").
5. Given a blueprint or verbal measurements, the worker will convert measures (fractions, decimals, and metric) correctly 100% of the time.
6. Given a measuring instrument, the worker will determine whether markings are presented in feet, inches, millimeters, meters, and tenths or hundredths correctly 100% of the time, .

Content

1. Read dimensions of units of measure on instruments, measuring rods, rules, and/or tapes.
2. Convert fractions to other equivalent fractions, convert millimeters to equivalent meters, and convert standard measures to decimal measures.
3. Change fractions from mixed to whole numbers and change whole and mixed numbers to fractions.
4. Transfer measurements from one object to another with a tape or rule.
5. Discuss conventions for location of mark when measuring.

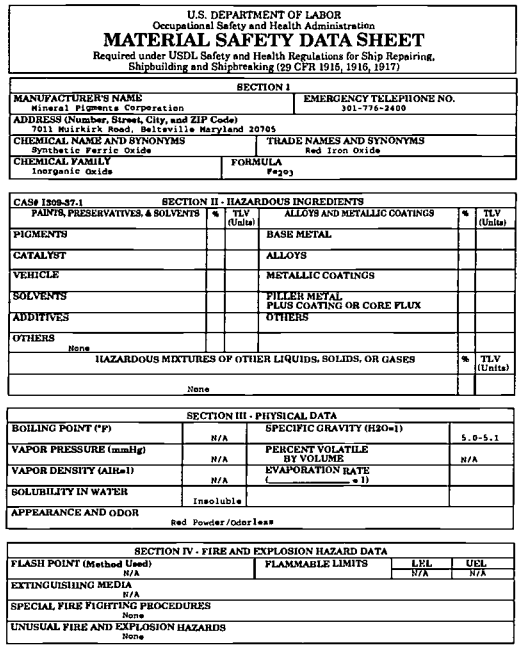
Reference

Job Functions	**Sample Tasks and Activities**
All	Calculate material needs Read instruments Calibrate instruments Build containment structure Erect barricades and signs

READ, INTERPRET, AND USE MATERIAL SAFETY DATA SHEETS

Context

Many of the substances that lead abatement workers use in the abatement process are hazardous. These may include solvents and encapsulants, as well as other substances intended to render the lead less dangerous. However, some of these substances have inherent dangers, as expressed in the material safety data sheets (MSDSs) provided by the manufacturer. Therefore, lead abatement workers must be able to read and interpret MSDSs in order to use the substances correctly and protect themselves from hazardous exposures.



U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME	EMERGENCY TELEPHONE NO.
Mineral Pigments Corperation	301-776-2400
ADDRESS (Number, Street, City, and ZIP Code) 7011 Muirkirk Road, Beltsville Maryland 20705	
CHEMICAL NAME AND SYNONYMS: Synthetic Ferric Oxide	TRADE NAMES AND SYNONYMS: Red Iron Oxide
CHEMICAL FAMILY: Inorganic Oxide	FORMULA: Fe_2O_3

CAS# 1309-37-1 — SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS: None					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
None		

SECTION III - PHYSICAL DATA

BOILING POINT (°F)	N/A	SPECIFIC GRAVITY (H2O=1)	5.0-5.1
VAPOR PRESSURE (mmHg)	N/A	PERCENT VOLATILE BY VOLUME	N/A
VAPOR DENSITY (AIR=1)	N/A	EVAPORATION RATE (_____ = 1)	
SOLUBILITY IN WATER	Insoluble		
APPEARANCE AND ODOR: Red Powder/Odorless			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method Used)	FLAMMABLE LIMITS	LEL	UEL
N/A		N/A	N/A
EXTINGUISHING MEDIA: N/A			
SPECIAL FIRE FIGHTING PROCEDURES: None			
UNUSUAL FIRE AND EXPLOSION HAZARDS: None			

Mastery Performance:

1. Given an MSDS, the lead abatement worker will locate each specific piece of information required to perform the work safely.
2. Given an MSDS, the lead abatement worker will read and interpret the information directly associated with the health risks and volatility of the material.
3. Given an MSDS, the lead abatement worker will find and understand the information associated with PPE included on the sheet.

Content:

1. Read and interpret sample MSDSs associated with lead abatement work.
2. Locate the various sections of the MSDS and discuss the types of information found in each.
3. Define terms commonly used on an MSDS that have implications for lead work.
4. Discuss where to find additional information about how to handle substances, as provided by the MSDS.
5. Practice finding and interpreting information contained in the MSDS.

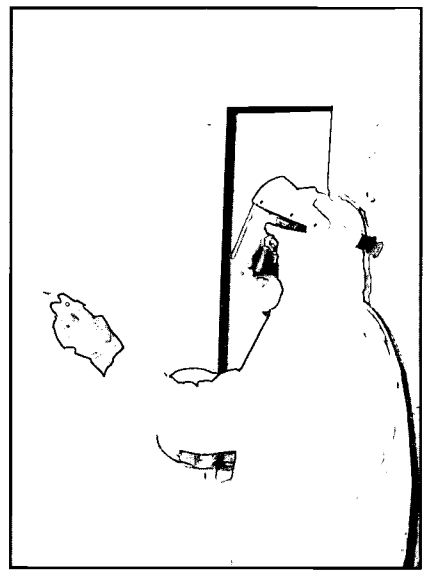
Reference:

Job Functions	Sample Tasks and Activities
All	Perform abatement procedures
	Perform clean-up procedures

USE APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT

Context

Lead abatement workers use personal protective equipment (PPE) to prevent exposure and/or serious injury to various body parts, such as skin, feet, eyes, hands, and head. The specific type of equipment assigned to a worker depends on the task being performed, type of hazard, and exposure level that might be encountered. Sometimes PPE is adjusted to conditions between outdoor bridge work and indoor residential cleanup. Typically, lead abatement workers wear hard hats, gloves, suits, respirators, and safety glasses on the job.



Mastery Performance

1. Given a lead abatement task and work conditions, the worker will identify the appropriate PPE to wear.
2. Given any PPE for lead abatement work, the worker will explain the selection of correct type, class, and size of PPE and demonstrate how to fit, adjust, and use it appropriately.
3. The worker will identify situations where special PPE is or may be required.

Content

1. Review types of eye protection and match each to the tasks and safety hazards for which it is used.
2. Demonstrate correct fit, use of each type, and care of PPE.
3. Review types of ear protection and match each to the tasks and safety hazards for which it is used.
4. Review types of boots and match each to the tasks and safety hazards for which it is used.
5. Review types of hard hats and match each to the tasks and safety hazards for which it is used.
6. Review types of gloves and match each to the tasks and safety hazards for which it is used.
7. Discuss conditions lead workers may encounter and match appropriate PPE to each situation.
8. Choose appropriate protective clothing for the various hazards that may be encountered by lead workers.

Reference

Job Functions	**Sample Tasks and Activities**
All	All

COMPREHEND AND FOLLOW SEQUENTIAL STEPS

Context

Lead abatement workers must learn to use specific sequences for many aspect of their jobs. For example, they follow specific sequences for donning and doffing PPE, particularly Tyvek® suits, respirators, gloves, and boots. In addition, they use specific sequences for sampling because air and surface materials must be collected and handled in a particular manner to ensure their viability. In addition, specific sequences are followed to mix materials used for abatement and/or encapsulation processes, to apply those materials in certain kinds of situations, and to follow prescribed clean-up sequences to ensure that all of the lead has been removed.

Mastery Performance

1. Identify the types of sequences used in lead abatement work.
2. Identify the steps for any particular sequence, putting them in an order that is acceptable to complete the work safely and productively.

Content

1. Explain and demonstrate the various sequences used in lead abatement work.
2. Explain the steps of each process.
3. Require trainees to practice the process by explaining the order that they actually use within the sequence.

Reference

Job Functions	**Sample Tasks and Activities**
All	Don and doff respirators Perform sampling Mix abatement materials Apply abatement materials Perform final cleanup and testing

PRACTICE SOUND ELECTRICAL SAFETY PROCEDURES

Context:

Lead abatement workers encounter electrical hazards on almost every work site. Typically, construction sites use temporary hookups and temporary wiring, have wet conditions and exposed metal surfaces, and suffer the deteriorating effects of heat, cold, and caustic materials. Particular hazards include abrasive and sharp surfaces like those left by the removal of building components. Other electrical hazards include tools that may not be double-insulated, which even when used correctly are subjected to damaging conditions, and the use of wetting agents during abatement.

Mastery Performance

1. Lead abatement workers will demonstrate correctly how to check wires for damage and identify problems every time.
2. Lead abatement workers will identify types of ground fault circuit interrupters (GFCIs), demonstrate how to check them, and explain how and why they are important.
3. Given a typical construction site, the lead abatement worker will identify correctly at least a half dozen electrical hazards.
4. Given three electrical lead abatement tools, the worker will assess the power requirements of each tool, and choose the correct length and wire gauge of the cord for each tool.

Content

1. Demonstrate use and inspection of GFCIs; discuss types of GFCIs.
2. Demonstrate and practice how to check wires for frayed/damaged insulation, sound connectors, continuity/broken wires, and grounding.
3. Demonstrate and practice how to check plugs for damage, water-tightness, and strain relief.
4. Discuss strategies for eliminating wet and metallic locations where tools must be used.
5. Demonstrate unplugging tools before changing parts to avoid "quick starts."
6. Demonstrate how to check tool for double insulation and sound casings.
7. Discuss appropriate heavy equipment position with regard to energized, and especially, high voltage power lines. Discuss warning signs regarding electrical danger.
8. Discuss, demonstrate, and practice rules for inspecting, marking, and documenting inspection of electrical wires.
9. Demonstrate how to use tool "free plates" to help determine wire gauge and length needs and boundaries for tools.
10. Demonstrate and discuss how to check for energized wires/circuits.
11. Demonstrate how to look for and use grounded plugs and receptacles.

Reference

Job Functions	**Sample Tasks and Activities**
All	Operate compressors and HEPA vacuums Operate lead and needle guns

PERFORM TRAFFIC CONTROL DUTIES

Context

Lead abatement projects often occur on or adjacent to high traffic volume highways. Lead abatement workers often are required to set up traffic control devices before a project begins. In addition, they may be required to assist with traffic control by flagging and signaling to ensure workers are protected from vehicular traffic.

Mastery Performance

1. Given a traffic control situation, a lead abatement worker will identify the correct flag or paddle signal to oncoming traffic every time.
2. Given a mock and proposed traffic circulation pattern, a lead abatement worker will identify the best possible circulation pattern to provide public and worker safety and maintain production every time.
3. Given a mock site and proposed traffic circulation pattern, a lead abatement worker will identify the correct locations for signs and barricades every time.
4. Lead abatement workers performing traffic control will place barriers, barricades, signs, signals, and other traffic control devices safely and at the correct distance and orientation every time.

Content

1. Discuss and practice signaling with flags and paddles.
2. Demonstrate traffic control strategies that provide for public safety, worker safety, and production.
3. Discuss, review, and demonstrate knowledge of the Uniform Traffic Control Code or state equivalent for flagging and signage requirements.
4. Understand and adopt traffic control planning and setup given real-life scenarios.

Reference

Job Functions	**Sample Tasks and Activities**
All	Identify and locate potential hazards

USE APPROPRIATE RESPIRATORS

Context

Lead abatement is dirty and hazardous work in which lead aerosols are only one type of atmospheric hazard. Lead abatement workers also use and work around caustic chemicals whose vapors are dangerous. For these reasons, lead abatement workers must wear respirators.

Mastery Performance

1. Given a lead abatement task and the need for respiratory protection, the worker will match the proper respirator to the hazard every time.
2. The lead abatement worker will demonstrate correctly how to inspect and don an air purifying respirator (APR), and choose appropriate filters every time.
3. The lead abatement worker will clean, sanitize, and replace defective respirator parts correctly every time.

Content

1. Discuss atmospheric hazards on the lead abatement construction site, including at least lead aerosols, chemical vapors, and welding/cutting fumes.
2. Identify and match types of respirators to hazards.
3. Demonstrate how to size, inspect, don, and adjust respirators.
4. Disassemble, name parts, and reassemble negative pressure APRs.
5. Practice inspecting, donning, and fit checking the respirator.
6. Discuss and demonstrate how to doff and clean respirators.
7. Practice how to doff and clean the respirator.

Reference

Job Functions	**Sample Tasks and Activities**
All	Perform air monitoring Perform heat-based abatement procedures Clear area Apply chemical solvents and encapsulation

SET UP AND USE FALL PROTECTION EQUIPMENT

Context

Lead abatement work includes the risk of falling from scaffolding and structures. The risks involved when working at heights are real, as well as increased, due to the use and handling of abatement equipment and materials. Further, wetting agents make work surfaces wet and slick. However, recent advances in fall protection materials and equipment can provide a safety margin on the job.

Mastery Performance

1. Given fall protection equipment, the lead abatement worker will demonstrate exactly how to use it, including donning the equipment, tying-off, and moving. The worker also will describe the limits and tolerances of the equipment.
2. Lead abatement workers will inspect equipment and correctly point out sound and defective components and equipment.
3. Lead abatement workers will show how to find (a) good anchorage and (b) the equipment rating.

Content:

1. Discuss all types of fall arrest systems.
2. Identify and discuss components of arrest systems like D-clips, snap hooks, shock absorbers, and anchorages.
3. Identify types of safety belts and how to wear, adjust, tie-off, inspect, and use one.
4. Practice correct use of safety belts.
5. Identify types of safety harnesses and and safety lifelines. Demonstrate how to wear, adjust, tie-off, check, and use one.
6. Practice correct use of safety harnesses.
7. Practice correct use of the lanyard.
8. Identify types of and demonstrate how to check, adjust, and attach one.
9. Practice use of the lifeline.

Reference:

Job Functions	**Sample Tasks and Activities**
All	Erect scaffolding Install access and egress to scaffold Inspect and adjust scaffolding or staging

INSPECT SCAFFOLDING BEFORE WORKING ON PLATFORM

Context

Scaffolds are a primary working surface for workers who abate lead-based paint. While scaffolds enable workers to get much closer to their work, reduce fatigue, and improve productivity, improper erection of scaffolds causes many accidents and accounts for large numbers of safety citations.

Mastery Performance

1. Given work to be performed on a scaffold, a lead abatement worker will perform a basic safety check of all points and ensure the scaffold conforms to safety requirements before ascending or beginning work.
2. Given a scaffold with a defect, the worker will identify the problem and suggest the criteria that must be met to correct the problem in 10 out of 10 instances.
3. Given a scaffold access , the worker will choose the most efficient access method and identify 10 out of 10 OSHA safety requirements for ladders and stairways.
4. Identify and test weakened scaffold planks with splits, checks, cracks, warps, bends, cuts, and other defects 10 of 10 times.
5. Ensure scaffolds are protected from compressive and tensile forces through structural ties located at least 21 feet vertically and 30 feet horizontally to avoid tipping and subsequent scaffold failure.

Content

1. Check planks for defects.
2. Ensure planks are secured, cleated and/or overlapped at least 12" (30 cm).
3. Ensure toe boards are in place on open edge of platform.
4. Ensure the scaffold is at least 10' (3 m) away from exposed or energized electrical wire.
5. Check that winds do not exceed 25 mph (40 kph).
6. Ensure that ladders are installed and secured for access and egress.
7. Ensure that scaffolds are tied-off (into structure) every 3 frames vertically and every 2 frames horizontally.
8. Check scaffolds for level, plumb, and that they are installed on mud sills.
9. Ensure that the load limit is not exceeded.
10. Ensure overhead protection if trade workers are working overhead.
11. Ensure guardrails (top/mid-rail) are installed and attached at prescribed heights.
12. Ensure that all bracing is attached and secured (clipped, wired, etc.).

Reference:

Job Functions	**Tasks and Activities**
All	Erect scaffolding Install access and egress to scaffold Inspect and adjust scaffolding or staging

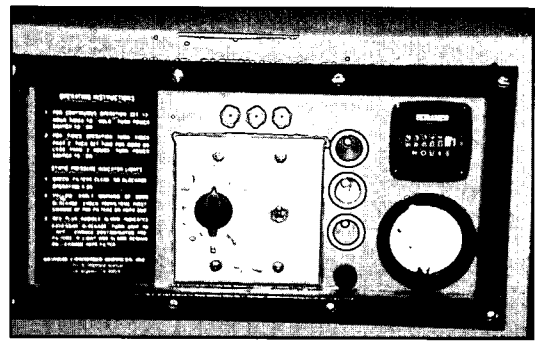
READ METERS, GAUGES, AND INSTRUMENTS

Context

One of the primary responsibilities of lead abatement workers is to operate various types of equipment. Each piece of equipment has one or more gauges or instruments that enable the operator to use the equipment efficiently. In fact, gauges and instruments are critical for accuracy and efficiency. Gauges can be found on equipment ranging from generators or compressors to personal air monitoring equipment. Job safety is tied directly to the ability to read these instruments. It is important that lead abatement workers be able to read gauges accurately for their work to be done efficiently, effectively, and safely.

Mastery Performance

1. Correctly identify the type of gauge and unit of measure for each piece of equipment used in lead abatement work 80% of the time.
2. Read the gauge correctly within one unit of measure 90% of the time.
3. Identify the unit of measure on the gauge correctly 80% of the time.
4. Convert the unit of measure to another useful unit of measure correctly 70% of the time.



Content

1. Describe and list four situations where instrumentation, meters, and gauges are used in lead abatement work.
2. Show three types of instruments and demonstrate how to read them.
3. Practice reading gauges on instruments or on pictures or simulations of instruments.
4. Discuss units of measure and explain how they are related to safety.
5. Convert units of measure to other units commonly used in lead work.
6. List acceptable ranges for the units of measure on the primary equipment used in lead abatement.

Reference

Job Functions	**Sample Tasks and Activities**
All	Sample and monitor air Calculate exposure Operate compressors and air driven

DEAL WITH TEMPERATURE EXTREMES

Context

Environmental conditions at lead abatement job sites can include temperature extremes leading to heat and cold stress. Lead abatement occurs in relatively small contained spaces. This type of work environment often has little air movement, which can increase temperatures in the work space. Conditions at a bridge lead abatement job may include high humidity from the water beneath the bridge, increasing the effects of both heat and cold. Adding to the existing environmental conditions, lead abatement workers must wear different levels of PPE, such as Tyvek suits and respirators, that can result in heat stress. Workers must be aware of the potential health effects of both heat and cold stress, as well as nonenvironmental factors that compound the effects of temperature extremes. They must be able to adjust their work accordingly.

Mastery Performance

1. Match the signs and symptoms of heat and cold stress correctly 90% of the time.
2. Identify the action(s) a lead abatement worker should take to remediate the temperature-induced situation correctly 80% of the time.
3. Monitor one's own pulse and weight accurately within 10% of exact on the job site.

Content

1. Identify the signs and symptoms of cold and heat stress and match each to the remediation steps available to the worker.
2. Demonstrate and coach how to monitor one's weight.
3. Demonstrate and coach how to monitor one's pulse.
4. Discuss appropriate ranges of weight loss and pulse rate on the work site.
5. Discuss situations where temperature issues become critical for the lead abatement worker. Include at least cold, hot, wet, and windy situations.
6. Set up scenarios and have trainees identify the probable type of temperature conditions that may be encountered, as well as the signs and symptoms they need to look for.

Reference

Job Functions	**Sample Tasks and Activities**
All	Anywhere needed

COMPLETE FORMS FOR SAMPLING AND PERSONAL EXPOSURE

Context

Lead abatement is a dangerous occupation with risks that derive from exposure to the material itself, as well as to other chemicals that may be used during the abatement process. One critical activity in protecting workers is their capacity to read the instruments, record the data from the instruments, interpret that data, and work the various calculations that are necessary to determine exposure rates. There is a standard for the allowable amount of airborne contaminants in the work area and a permissible exposure limit for lead abatement workers. Samples of contaminants in the air are collected at the beginning of work, at the end of work, and at periodic intervals during the work day in order to correctly monitor the exposure levels to make appropriate decisions about who can be working in specific areas for specific durations any work day. Performing this task requires that workers read and record the figures on their personal air monitors, as well as on the sampling instrumentation. Further, they must be able to interpret and compare those figures over time in order to determine exposure rates and the relative efficiency with which the job is proceeding. Recording takes place both in terms of forms supplied by the contractor that monitor the on-going air quality in the work area, as well as forms that individual workers should maintain for their own health and protection.

Mastery Performance

1. Given a typical form for tracking lead contaminants in the air, the worker will correctly fill in the accurate unit of measure within ± 2 units 90% of the time.
2. The worker will distinguish the various sections of the form and identify the kind of information that goes into each area.
3. The worker will demonstrate an effective way to track and record his/her personal exposure from work activity.

Content

1. Illustrate the types of sampling and air quality forms used by a number of contractors on the work site.
2. Illustrate the types of simple records that individual workers might maintain on a regular basis regarding their own exposure.
3. Demonstrate how to complete the various contractor supplied forms by discussing and including information in each appropriate section of the form.
4. Discuss the various units of measure and how they relate to each other as well as the regulations and safety implications from exposure.
5. Practice encoding the information on tracking forms using personal air monitoring devices as well as sampling devices in the training setting.
6. Require trainees to individually take the information from the monitoring devices and record it in both personal tracking forms and the contractor supplied air monitoring forms. Require that trainees not only record and maintain the information, but appropriately discuss the place in the form it goes, and what the information actually means.

Reference

Job Functions	**Sample Tasks and Activities**
All	Perform air monitoring. Perform heat-based abatement procedures. Clear the area. Apply chemical solvents and encapsulation. Select appropriate respirators and other PPE. Calculate daily exposure for individuals as well the entire work crew.

IDENTIFY AND KNOW PROCEDURES TO ADAPT TO AND CONTROL ENVIRONMENTAL HAZARDS

Context

Lead abatement work, even within the containment areas, is subject to changing environmental conditions, just as is most other construction work. That is, windy conditions for abatement on exterior structures such as bridges, rain and high humidity during abatement in almost any situation, extremely high heat, particularly during residential abatement, and freezing conditions each affect the process of lead abatement. In each case, the lead abatement worker must understand the difference that the environmental condition makes in the relative effectiveness and application procedures necessary for abatement and take appropriate measures to mitigate those environmental circumstances. This means that a number of procedures, ranging from providing additional heat to providing additional ventilation and cooling, to re-structuring the encapsulation area, to changing the abatement procedure must be initiated in order to successfully complete the job.

Mastery Performance

1. Given an environmental condition and a lead abatement situation, the worker will correctly match the appropriate mitigation procedure or change with each environmental circumstance.
2. The lead abatement worker will correctly describe changes in procedure that must be initiated to allow the abatement process to continue effectively.
3. The lead abatement worker will correctly identify the consequences of failing to attend to the changing environmental situations.

Content

1. Discuss the various environmental situations that impact different abatement procedures, matching the various environmental issues with the different abatement procedures.
2. Discuss the ways to change abatement procedures or mitigate the environmental factors.
3. Demonstrate how to change practices such as containment construction and ventilation to accommodate the different environmental situations.
4. Require trainees to accurately match environmental difficulties with remediation procedures that mitigate those environmental situations.

Reference

Job Functions	**Sample Tasks and Activities**
All	Perform heat-based abatement procedures. Apply chemical solvents and encapsulation. Build structural containment. Rig and move materials.

Acknowledgements

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Labor and Management Coalition Members

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U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement (OERI)
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