

**THE  
CENTER  
TO  
PROTECT  
WORKERS'  
RIGHTS**

**CPWR**

# **Model Specifications for the Protection of Workers from Lead on Steel Structures**

Revised

September 2002

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The Center to Protect Workers' Rights (CPWR) is the research arm of the Building and Construction Trades Department, AFL-CIO. The first edition of this publication was developed by a working group convened by CPWR, in collaboration with the Occupational Health Foundation and the Steel Structures Painting Council, in 1993. This revised version of the model specifications incorporates the recommendations of a working group convened in 1995 and a peer review committee, which met in 1999 following implementation and evaluation of the model specifications on a major bridge rehabilitation project. Preparation of the revision has been supported by grant number CCU317202 from the National Institute for Occupational Safety and Health (NIOSH). The contents are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.

### **Abbreviations**

CFR	Code of Federal Regulations
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
LHASP	Lead health and safety plan
NIOSH	National Institute for Occupational Safety and Health
OSHA	U.S. Occupational Safety and Health Administration
PEL	Permissible exposure level
ug/dL	Microgram(s) per deciliter
ug/m <sup>3</sup>	Microgram(s) per cubic meter

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## I. Introduction - the Need for a Comprehensive Approach

- A. **The Rationale and Need for Model Specifications.** Since 1991, funding for the repair and maintenance of U.S. steel bridges - numbered at over 112,000 - has continued to mushroom. The Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21), which authorized \$217 billion for highway and mass transit construction between 1998 and 2003 has been described as the largest public works bill in U.S. history.<sup>1</sup> Funding for rehabilitation and maintenance of existing lead-painted infrastructure continues to take a major share of this revenue.

The deteriorating condition of the nation's transportation infrastructure combined with the potential for high lead exposures associated with bridge restoration work threatens workers and their families with a high risk of lead poisoning absent a comprehensive approach to prevention. Health risks associated with exposure to lead include impaired blood synthesis, nervous system disorders, gastrointestinal effects, malformation of sperm and offspring and kidney damage.

OSHA has estimated that over 5000 bridge repainting and rehabilitation projects involving lead exposure will occur each year (Federal Register, 1993). In addition, exposures greater than 400 times the current OSHA Permissible Exposure Limit (PEL) for construction have been documented during torch burning and abrasive blasting - activities common to bridge rehabilitation and demolition work.

Owners and contractors have a clear interest and responsibility in ensuring that work on lead painted structures does not endanger the health and well-being of workers, their families, the community and the environment. Reliance on regulatory enforcement *alone* is wholly inadequate since: 1) enforcement is scarce relative to the large volume of work underway, and; 2) compliance approaches often identify problems *after* harmful exposures have already occurred. This document outlines a comprehensive, proactive approach to occupational lead poisoning prevention centered around the use of contract specifications.

As owners, state and federal transportation agencies, city and county governments, and others such as turnpike commissions, play a critical role in how work on lead painted infrastructure is performed. Development of specifications which require suitably protective work practices and controls, selection of a qualified contractor and enforcement of the specifications are the responsibilities of the owner.

Specifications govern the terms of work in construction. They define how a job will be carried out and what activities will be compensated. Elevating worker protection to a detailed element of job specifications paid for by owners is an important means of fully integrating safety and health into

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<sup>1</sup>Pub. L. No. 105-178, June 9, 1998.

construction operations.

**B. Overview for Model Specifications Development and Evaluation.** These *Model Specifications for the Protection of Workers from Lead on Steel Structures* are intended to serve primarily as guidelines for language governing lead health and safety contractor requirements. The first version of this document was developed by a diverse group of public health experts, contractors, industry trade associations, government agencies and labor representatives in 1993. A roster of participants appears in **Appendix A**.

Following the development and widespread dissemination of the 1993 *Model Specifications*, the Center to Protect Workers' Rights implemented the *Model Specifications* on a lead abatement project at a NASA facility in Cleveland, OH in 1994.<sup>2</sup> In addition, a survey of state transportation and health agencies and a review of "Best Practices" for effective safety and health programs was conducted.<sup>3,4,5</sup> Based on the outcome of these efforts, a second Working Group meeting was convened in 1995 to augment and update the language developed in 1993. A roster of participants in the 1995 Working Group meeting appears in **Appendix B**. In 1996, the specifications were revised to incorporate recommendations resulting from that process.

Between 1997 and 1999, CPWR used participatory research methods to evaluate the effectiveness of the revised model language in an applied "real-world" highway setting. The Michigan DOT incorporated special provisions drawn from CPWR's *Model Specifications* into specifications governing rehabilitation of the Blue Water Bridge - a 60 year old bridge which spans the St. Clair River, a major Great Lakes shipping artery between Port Huron, Michigan, U.S.A. and Pt. Edward, Ontario, Canada. An Action Research Team (ART), which included representation from the principle trades employed on the project (ironworkers, painters, laborers, carpenters, electricians, and operating engineers), MDOT, Michigan OSHA (MI OSHA), the general and painting contractors, and project insurance carrier representatives, met regularly to review implementation of the model contract specification language. The Blue Water Bridge ART Roster is included in **Appendix C**.

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<sup>2</sup> Susi, P. & Ventura, J. Implementing and Evaluating Model Lead Specifications. SSPC's 9<sup>th</sup> Annual Conference. March 11-13, 1996.

<sup>3</sup> Erville, P. Implementing Lead-Safe Work Practices for Steel Structures: Transportation Agency Policies in 12 States. July 1995.

<sup>4</sup> Goldberg, M., et. al. Occupational Blood Lead Surveillance of Construction Workers Health Programs in 12 States. November 1995. Occupational Blood Lead Surveillance of Construction Workers, II Health Programs in 13 States. March 1997

<sup>5</sup> CPWR (1995) Best Practice Issues Review: Recommendations for Revisions to the Center to Protect Workers' Rights Model Specifications for the Protection of Workers from Lead on Steel Structures. Silver Spring, MD.

In 1999, a Peer Review Committee was formed to review evaluation efforts and finalize publication of CPWR's *Model Specifications*. This document reflects the recommendations of that Committee which is chaired by Dr. Eula Bingham of the University of Cincinnati.

These specifications may be applied to work on lead painted structures owned by municipalities, private industry or other government agencies. However, they were developed primarily to assist state and federal transportation agencies in protecting workers from excessive lead exposure during repair, repainting or demolition of lead painted bridges and elevated highways. While this document focuses primarily on lead hazard prevention, contract specifications are an important means of addressing a much broader spectrum of health and safety hazards.

## **II. Owner Guidance for Quality Assurance of Contractor Safety and Health Performance**

Specifications are an essential contractual tool for improving safety and health conditions in construction. However, they are only one part of the equation. As the controlling interest in construction projects, owners must ensure that:

- contractors are aware of the potential hazards associated with the rehabilitation, maintenance and demolition of lead painted structures;
- contractors are qualified to perform work safely; and
- contractors conduct work in such a manner that workers, their families, the environment and the community are protected from exposures to lead and that their employees are guaranteed their right to a safe and healthful workplace.

Ensuring that *all* of these requirements are met involves integration of safety and health into each and every phase of construction, including project design and planning. Owners responsible for lead-painted structures can prevent contamination of the environment, surrounding communities and workers by having:

- more active involvement in contractor selection and oversight, and
- greater involvement in planning and communicating hazards associated with their structures.

Recommendations for incorporating safety and health into each stage of project planning and execution are listed below:

### **Pre-bid Phase**

**Job Planning.** In the interest of the owner, the public, contractors and their employees, records which document the hazards associated with work on a particular structure and procedures, either planned or completed, for controlling those hazards should be retained by the owner and communicated to prospective contractors.

*1) Owners should develop a written safety and health plan that identifies all recognized hazards and minimum requirements for controlling those hazards for each project prior to the selection of contractors.*

*2) Owners should designate a qualified safety and health planning coordinator to develop the plan and communicate and deliver the plan to the contractor.*

*3) Owners should maintain a “living file” on structures. The information contained in the file should be communicated to prospective contract bidders to ensure that the means for controlling identified hazards are built into the project design.*

**Mandatory Pre-bid Meetings.** Pre-bid meetings provide an opportunity for owners to inform contractors of potential hazards and discuss the worker, community and environmental protection measures required on these projects. If feasible, contractors should be required to visit the proposed work site. Instead of holding a pre-bid meeting for each project, owners may prefer instead to conduct an annual general meeting that all potential contractors must attend. During this meeting, the requirements of a lead health and safety plan, owner expectations for contractor performance and enforcement mechanisms should be outlined.

*4) Owners should communicate identified hazards and minimum requirements for abating hazards to contractors interested in bidding work.*

**Pre-qualification and Contractor Selection Requirements.** A contractor's past performance should be evaluated to determine their ability to complete work safely. Information that should be reviewed as a measure of performance includes:

- Health and safety programs of previous lead projects
- Prior serious or willful OSHA citations
- Workers' compensation ratings
- Experience modification rating (EMR)
- OSHA 200 and 101 logs
- Citations issued by environmental regulatory agencies

Contractors whose previous experience indicates poor performance in the area of safety and health should be considered non-responsive during the pre-bid stage for the next contract season. In addition, contractor certifications which demonstrate competence in the removal of hazardous paints should be considered by owners for contractor selection. As an example, use of the Society for Protective Coatings (SSPC), Painting Contractors Certification Program (PCCP)

could be used to evaluate a painting contractors' competence for deleading work.<sup>6</sup>

***5) Only contractors who can demonstrate they are capable of performing work on lead painted structures without creating a hazard to their employees, the public or the environment should be permitted to submit bids.***

**Submittals.** Contractors should be required to submit an outline of their Lead Health and Safety Plan (LHASP) as well as other documentation (e.g. worker/supervisor training certifications) in response to the specifications with their bid. Alternatively, the owner could require that bidders complete a 1-2 page form that requires contractors to describe how they will address each element of the LHASP. Information on the contractor's experience in executing a Lead Health and Safety Program could be collected as part of this process. This approach will ensure that each element of the program is included in the bid price and also assist DOT agencies in assessing contractor experience. Only those contractors who have submitted a bid which can reasonably be expected to provide adequate protection to workers should be considered for contract awards.

Owners should utilize a qualified health and safety professional, such as an industrial hygienist, to critically review submitted LHASPs. Transportation agencies could best perform this function with in-house support and/or in concert with the assistance of state health agencies. For instance, some state DOT agencies have an industrial hygienist on staff to carry out this task. An alternative approach is to retain an on-call professional consultant to act in an "owner's representative" capacity. The DOT should ensure that consultants are independent from bidding contractors in order to prevent any potential conflict of interest from arising. One approach to assure that a conflict of interest does not arise is for the DOT to contract directly with the consultant.

***6) Owners should require that prospective bidders submit preliminary materials describing their health and safety plan.***

***7) Owners should review preliminary materials with the intent of selecting only reasonably qualified contractors to submit bids.***

***8) Owners should review bids to ensure that contractor personnel have adequate training and technical capability and sufficient labor hours have been estimated to perform the functions described in the contractors health and safety plan.***

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<sup>6</sup>SSPC-QP 2: Standard Procedure for Evaluating the Qualifications of Painting Contractors to Remove Hazardous Paint (latest edition). SSPC: The Society for Protective Coatings. Pittsburgh, PA, 2000.

## Pre-construction Phase

**Verification and Approval of the Contractor's Lead Health and Safety Plan.** At this phase, a qualified contractor has been selected and a preliminary outline for the LHASP has been approved by the DOT. The DOT would now verify the mobilization of appropriate and adequate resources relevant to worker protection (e.g. ventilation equipment, sanitation facilities, personal protective equipment, etc.) by the contractor for the awarded project. The DOT should review the contractor's full written LHASP prior to the initiation of work. Qualifications of the on-site Construction Safety and Health Specialist, Industrial Hygienist and other personnel as well as documentation verifying pre-assignment training, medical surveillance, and respiratory fit testing should be reviewed. Once the written LHASP and all other documentation required by the specifications has been approved by the DOT, the contractor would be authorized to move into the construction phase.

*9) Owners should verify the contractor's mobilization of adequate resources, procedures and qualified personnel necessary for implementation of the LHASP.*

*10) Owners should have qualified personnel on staff to review and approve the contractor's Lead Health and Safety Plan (LHASP) prior to the start of work.*

**Notification of Project Start-up to Appropriate Agencies.** State and federal agencies responsible for worker protection are an important resource for transportation agencies. Consultation programs are available which may be useful in project planning and to provide support once work is underway. Given the transient nature of construction, the large number of construction sites and limited OSHA staffing, transportation agencies can greatly assist worker protection agencies by giving adequate advance notice of project start dates to state and federal agencies responsible for ensuring workers are protected from occupational lead hazard.

*11) Owners should notify the appropriate regulatory agency responsible for worker protection of upcoming project start dates and regulated hazards at least 10 days prior to the start of work.*

## Construction Phase

While not a substitute for exposure monitoring, worker blood lead levels (BLLs) are one barometer of how effective a contractor's LHASP is in practice. Certified copies of all employee BLLs which do not contain the names or social security numbers of individual workers should be forwarded to both the DOT and the state blood lead registry office in states where they exist no later than 5 days after receipt. State lead registries provide a useful means of tracking job sites with elevated BLLs. Interagency cooperation between state health and transportation agencies is important to ensure that lead registries effectively identify problem job sites and intervene to prevent further exposure to workers. In states where blood lead

registries exist, state health departments should report those sites with elevated BLLs to the DOT. This information can facilitate followup site visits aimed at identifying and remediating the problem. Interagency cooperation can extend further to provide consultation services to the contractor looking for constructive assistance, or if necessary, involve the efforts of agencies charged with enforcing worker health and safety laws.

Enforcement of the project specifications is the responsibility of the owner. Therefore, DOT personnel, or their authorized representatives, should serve as front-line inspectors of contractor compliance with the LHASP. Although DOTs will need to train and maintain qualified staff, or retain outside professional support, coating or welding inspectors could be utilized for much of this work. For example, professional industrial hygienists (in-house or hired on a consulting basis) could develop site-specific enforcement checklists which could be used by trained DOT inspectors on a daily basis.

***12) Owners should work in collaboration with state health and labor agencies to monitor the performance of contractors and intervene when necessary.***

***13) Owners should designate a Project Safety and Health Coordinator to ensure that the written plan prepared by the Planning Coordinator is being followed.***

***14) A Project Committee should be established made up of co-chairs of the joint safety and health committee established by the contractor, the Construction Safety and Health Specialist and the owner's Project Safety and Health Coordinator. The Committee should meet at least once per month to identify and remediate problems.***

***15) Owners should use contract provisions to withhold payment or remove contractors from the job-site who fail to comply with the written safety and health program.***

### III. Contractor Safety and Health Specifications

#### A. General Provisions

##### 1. Introduction

Work under this item shall consist of implementation of a Safety and Health Plan. The contractor will be fully responsible for the protection of his or her employees and any subcontractor personnel from recognized safety and health hazards. It shall be the contractor's responsibility to protect the health and safety of all personnel on the job and the safety and health of the public from hazards associated with construction activities on this project. The contractor shall comply with federal, state and local laws, ordinances, rules and regulations governing safe work-practices and use of equipment and materials necessary to control occupational and environmental hazards.

##### 2. Submittals and Applicable Documents

Prior to the start of work, the contractor shall submit to the engineer, a written safety and health plan. The plan shall include, but not be limited to, a hazard prevention program, worker education and training, and record keeping consistent with Subpart C - General Safety and Health Provisions for Construction (29 CFR 1926.20 through 1926.35).

##### 3. Quality Assurance

- a. *Joint Safety and Health Committee (JSHC)*. Meaningful employee participation and regular communication between labor and management are essential for effective safety and health programs. Joint Safety and Health Committees are necessary for the regular exchange of information between contractors and their employees.

The general or prime contractor shall establish a site-based joint safety and health committee (JSHC) upon the onset of work. If there is no general or prime contractor on site, the owner shall establish a JSHC made up of individual contractors and their employees engaged in work on the site.

Each craft and each sub-contractor present on site will be represented on the JSHC, except in the case of projects less than one month in duration in which case the committee shall consist of at least one labor and one management representative. On unionsites, the labor representative shall be a safety steward assigned by their respective labor organization. On non-union sites the labor representative should be elected by the work force.

The JSHC shall be composed of at least 50% labor representatives and co-chaired by both a management and labor representative. Those individuals serving as chairpersons of the JSHC shall have received training in safety and health regulations, hazard recognition and control, communication, and the roles and responsibilities of committee representatives. Chairpersons shall be given adequate time to prepare for meetings (at least one hour). The JSHC shall meet regularly, at least once per month.

Committee chairpersons and stewards shall have the authority by the owner to remove workers from unsafe work conditions for which there is a reasonable cause to believe that an imminent danger exists.

- b. *Trade Committee.* A Trade Committee shall be established composed of one worker representative from each craft on site. On union jobs, such representatives should be designated as safety stewards. On non-union jobs, the trade representative should be elected by members of their respective craft serving in a non-supervisory capacity. The Trade Committee shall meet at least once per month at least 48 hours prior to the JSHC. The function of the Trade Committee shall be to inform the JHSC of the occupational health and safety concerns held by tradespeople on the project. The names, trades represented and employer of members serving on the Trade Committee will be noted and posted at designated locations in order to make individual workers aware of their designated safety and health representative. Communication between workers and trade representatives shall be facilitated by the appropriate contractor.

Representatives serving on the Trade Committee and the foremen for the sub-contractors to which they are employed should conduct regular site inspections (at least once per week) for the purpose of:

- verifying compliance with the written safety and health plan;
- communicating between workers in the trades they represent and/or employ, respectively, and the JSHC
- monitoring site conditions to ensure that employees and the public are being adequately protected from health and safety hazards associated with construction activities.

- c. *Responsibilities of the JSHC.* The co-chairs of the JSHC shall set meeting dates, times and locations and prepare JSHC meeting agendas. The JSHC shall maintain and keep minutes of its proceedings and make them available for review by workers and their designated representatives. Committee members shall be paid by their employer while serving on the committee. All time spent in attendance at Committee meetings or in activities relating to the function of the Joint Committee will be compensated at the member's current rate of pay.

**Meeting minutes.** Meeting minutes shall be recorded to identify hazardous conditions, what and when corrective action is to be taken and who is responsible for this action. The minutes will be typed by the employer and be available for pick-up by JSHC Co-chairs within three (3) working days after the meeting or as the Committee may from time to time instruct. Minutes of meetings will be reviewed and edited where necessary, by the Co-chairs, then signed and circulated to all Committee members before any broader circulation takes place. Agenda items will be identified by a reference number, and be readily available in a proper filing system. Names of Committee members will not be used in the minutes.

**Meeting agenda.** The agenda shall be the minutes of the previous meeting plus any new business. All items that are resolved will be reported in the minutes. Unresolved Items will be placed on the agenda for the next meeting.

The JSHC will review reports made by safety and health personnel employed by the contractor and provide regular input into the implementation of the site safety and health program. The JSHC will make recommendations to occupational safety and health personnel employed by the contractor. Recommendations of the committee must be acted upon in a timely manner. The presence of a JSHC does not supercede nor negate the contractor's duty to provide a safe and healthful workplace.

**B. Lead Specifications**

**1. General Information**

**a) Introduction**

Work under this item shall consist of implementation of a Lead Health and Safety Plan. This special provision is applicable on any job where an employee may be occupationally exposed to lead. The intent of this special provision is to prevent employee absorption of harmful amounts of lead in any form by inhalation or ingestion and to prevent lead exposure to the families of workers through take-home exposure via contaminated clothing, vehicles or other personal items, such as tools or lunch boxes. The contractor will be fully responsible for the protection of his or her employees and any subcontractor personnel from exposure to lead as well as other recognized safety and health hazards. Other hazards which may be associated with work on this structure include, but are not limited to, heat stress, noise, ergonomic hazards, heavy metals other than lead, falls and electrical hazards.

**b) Site Conditions**

The paint contained on this structure contains lead. Lead has been shown to have serious health effects on workers if caution and attention to details are not followed.

**c) Applicable Documents**

The contractor shall comply with the requirements of the Interim Final Rule for Lead Exposure in Construction (29 CFR 1926.62) of the U.S. Occupational Safety and Health Administration (OSHA) and any other applicable federal or state laws. Additional Federal regulations which must be complied with include, but are not limited to:<sup>7</sup>

29 CFR Part 1926.16	Rules of Construction
29 CFR Part 1926.59	Hazard Communication
29 CFR Part 1926.33	Access to Employee Exposure and Medical Records
29 CFR Part 1926.20	General Safety and Health Provisions
29 CFR Part 1926.21	Safety Training
29 CFR Part 1926.28	Personal Protective Equipment
29 CFR Part 1926.51	Sanitation
29 CFR Part 1926.55	Gases, Vapors, Fumes, Dusts and Mists
29 CFR Part 1926.57	Ventilation

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<sup>7</sup>On June 30, 1993, OSHA officially incorporated all applicable General Industry Standards (Part 1910) into the Construction Industry Standards (Part 1926). OSHA revised Part 1926 by adding the applicable Part 1910 Standards to part 1926. Copies of Federal regulations can be obtained from the Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

29 CFR Part 1926.103	Respiratory Protection
29 CFR Part 1926.200	Accident Prevention Signs and Tags
29 CFR Part 1926.353	Ventilation and Protection in Welding, Cutting and Heating
29 CFR Part 1926.354	Welding, Cutting and Heating in Way of Preservative Coatings
29 CFR Part 1926.32	Competent Person
29 CFR Part 1926.64	Process Safety Management of Highly Hazardous Chemicals
29 CFR Part 1926.1127	Cadmium
29 CFR Part 1926.1118	Inorganic Arsenic

**d) Definitions**

*Industrial Hygienist (IH).* Industrial hygienists shall have the following qualifications: current certification by the American Board of Industrial Hygiene with field and sampling experience, preferably in the construction industry; or hold a Master's degree from an accredited college or university in the field of engineering, chemistry, physics, biological sciences, industrial hygiene, toxicology, the environmental sciences or a related field and have at least two years of full-time experience as an industrial hygienist, including field and sampling experience, preferably in the construction industry; or hold a Bachelor's degree in the field of engineering, chemistry, physics, biological sciences, industrial hygiene, toxicology, the environmental sciences or a related field and have at least three years of experience as an industrial hygienist, including field and sampling experience, preferably in the construction industry.

*Construction Safety and Health Specialist (CSHS).* Construction Safety and Health Specialists shall be capable of identifying hazardous or dangerous conditions related to lead. CSHSs shall have experience in the construction industry (preferably in highway and bridge rehabilitation), and formal training and experience in safety and health. Such formal training and experience shall include at a minimum:

- ! Five years experience in construction, including building trades experience
- ! 32 hours of lead abatement training for "superstructures"
- ! 30 hours of general safety and health training equivalent to the OSHA 500 Course
- ! 24 hours of training in industrial hygiene with an emphasis on air monitoring including on-the-job experience.<sup>8</sup>

In addition, personnel employed by the contractor responsible for safety and health should have qualifications consistent with federal and state regulations. While the contractor may elect to train and authorize the CSHS to serve as the competent person as defined by 29 CFR Part 1926.32, these

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<sup>8</sup> Examples of acceptable air monitoring courses include the Science and Air Monitoring Courses offered as part of the International Union of Painters and Allied Trades (IUPAT) Painter Safety and Health Technician Program at Marshall University and Industrial Hygiene Sampling courses offered at NIOSH Educational Resource Centers (ERCs). A list of Building Trades Unions, including the IUPAT, and NIOSH ERCs can found in **Section V. Additional Resources.**

specifications do not require that the CSHS serve in this capacity. The CSHS shall have the authority to take prompt corrective action whenever necessary to enforce the safety and health requirements of this specification.

e) **Submittals**

1) Lead Health and Safety Plan

A Lead Health and Safety Plan (LHASP) must be submitted to the DOT prior to the initiation of work and should be specific to the job site. Filing of the plan will not constitute approval by the DOT. A copy of the Interim Lead Standard and other prevailing regulations should be submitted with this plan. Material Safety Data Sheets (MSDSs) for any chemical products to be used on the site should be submitted. The contractor's project supervisor shall be able to demonstrate that he or she has read and understands these documents. Training certifications for supervisors and employees should be submitted as well as contractor certifications, where applicable. A copy of the LHASP, applicable standards, MSDSs and Certifications must be on site at all times.

The LHASP must include, but is not limited to, information on the following topics:

- a) General Introduction
- b) Lead Health and Safety Organization and Responsibilities
- c) Exposure Assessment Strategy
- d) Engineering and Administrative Controls
- e) Respiratory Protection
- f) Protective Work Clothing and Equipment
- g) Hygiene Facilities and Practices
- h) Housekeeping
- i) Medical Surveillance Program, including Medical Removal Protection and Worker Notification Procedures
- j) Decontamination Procedures
- k) Employee Information and Training Procedures
- l) Record Keeping

2) Monthly Reports

The Industrial Hygienist shall certify in writing to the Engineer or designated owner representative (hereafter referred to as the Engineer) that the contractor has performed all of the listed requirements of the Lead Health and Safety Plan. The report shall include an action plan to address any deficiencies found during the previous month. Results of blood lead level monitoring, air monitoring and wipe sampling shall be included. The Industrial Hygienist shall approve all changes to the LHASP. The Engineer shall be immediately informed by the Industrial Hygienist or CSHS of all major decisions regarding any changes to the LHASP. A copy of the monthly report shall be provided to the JSHC.

f) **Quality Assurance**

- 1) *Industrial Hygienist (IH)*. Contractors shall engage a qualified IH to:
  - a. Develop a written LHASP.
  - b. Review the adequacy of the LHASP on a regular basis and update accordingly with respect to changing site conditions if necessary.
    - c. Develop and oversee an exposure assessment strategy that includes personal air monitoring, wipe sampling and evaluation of the effectiveness of engineering and work practice controls.
  - d. Prepare monthly reports for presentation to a site-based joint safety and health committee (JSHC), in accordance with these specifications, which summarize industrial hygiene activities including air and wipe sampling, biological monitoring and a deficiency action plan.
  - e. Develop and oversee the implementation of a respiratory protection program that complies with 29 CFR 1926.103.
  - f. Review blood lead level monitoring results as necessary with the physician in order to assess the efficacy of controls. (Job assignments for workers with elevated BLLs should be based on collaboration of the JSHC, IH, CSHS, physician and contractor).
  - g. Develop detailed check lists for use by the CSHS in verifying compliance with the LHASP, periodically monitor the work site, and inform the contractor and JSHC of any deficiencies noted as well as suggest corrective actions.
  - h. Conduct monthly follow-up training with employees based on input of JSHC.

While the CSHS may serve as the primary on-site monitor of the LHASP, the IH must be on site at least once a week during activities which have been associated with or can reasonably be expected to create lead exposures in excess of 30 ug/m<sup>3</sup>. The IH shall be on site more frequently at the start of the project or when site conditions or work practices change until exposure monitoring indicates that exposures are being effectively controlled. An increase of 10 ug/dL or greater in worker BLLs will prompt more frequent site visits by the IH until corrective measures have successfully reduced BLLs to below 25 ug/dL.

The IH shall certify monthly in writing, within 5 days after the end of the month, to the DOT that the contractor has performed all of the listed requirements of the Lead Health and Safety Plan and any actions taken on any deficiencies found. The IH shall approve any changes to the LHASP. The DOT shall be immediately informed by the IH or CSHS of all major decisions regarding any changes to the LHASP.

The IH shall also evaluate potential exposure hazards related to the use of chemical products, including new paint coatings, and institute effective controls.

- 2) *Construction Safety and Health Specialist (CSHS)*. The contractor shall engage a Construction Safety and Health Specialist (CSHS), who is not the project superintendent or foreman, to ensure compliance with the LHASP. The CSHS shall be on site at all times when work requiring implementation of the LHASP is in progress. The CSHS shall be empowered to perform safety and health responsibilities without fear of retribution and provided with adequate duty-time to execute job responsibilities. Determination of duty time will be dependent on the specific responsibilities of the CSHS, the nature of the site and site-specific hazards.

The CSHS will be responsible for:

- a. Implementing and monitoring compliance with the LHASP on a daily basis.
  - b. Communicating with the JSHC and IH regarding implementation of the LHASP and areas needing improvement.
  - c. Assisting the IH in exposure assessment activities.
  - d. Communicating results of exposure monitoring to workers on a regular basis with the support of the IH as needed.
  - e. Ensuring daily compliance with the contractor's respiratory protection program.
  - f. Utilizing developed check lists under the direction of the IH.
  - g. Working with the JSHC and IH in the implementation and evaluation of interventions and control technologies.
  - h. Convening regular tool box talks to address identified problems and provide ongoing training on safety and health program elements for workers.
  - i. Maintaining a log of all personnel entering work areas with potential lead exposures. The log shall include the name and social security number of the individual, the date, the time at which they enter and leave the area, the task/job being performed and exposure monitoring data, if any has been collected.
- 3) The IH and CSHS shall consult with and conduct site walk-throughs with an owner representative to determine compliance with the LHASP at a regular frequency of at least two times per month.
- 4) *Medical Surveillance*. The contractor shall institute a medical surveillance program consistent with the requirements of Appendix C of 29 CFR 1926.62. All medical procedures required by this program shall be provided by the contractor at no cost to the employee. Employees shall receive full wages and benefits for all time involved in medical testing. The medical surveillance program must be overseen by a licensed physician. All blood tests and physical exams shall be provided to employees at a reasonable time and location. The employer shall notify each employee in writing of their biological monitoring results within 5 working days of receipt of such results.

Employees with BLLs 25 ug/dL or greater shall be notified that this specification requires medical removal protection when their BLL exceeds 30 ug/dL. Should an employee's BLL exceed 30 ug/dL on any test, the employee must be retested within two weeks.

Should the second BLL exceed 30 ug/dL, the employee shall be removed from further lead exposure, either by being assigned alternative duties which entail no potential exposure to lead, or, if this is not possible, being removed from the job.

Employees removed under Medical Removal Protection (MRP) are entitled to the same earnings, seniority, and other rights and benefits they would have received if they had not been removed. Earnings include base wages plus overtime, shift differentials, incentives and other compensation they would have received had they not been removed.

Biological monitoring shall occur at the following frequency:

- ? Initial baseline monitoring upon hire or start of job;
- ? Monthly, thereafter;
- ? Exit testing when the job is completed or a worker is terminated.

In addition, the following provisions shall be implemented:

- i. An increase of 10 ug/dL or greater from one test to another shall trigger a work site evaluation by the CSHS and the IH to identify problem areas and implement appropriate control measures that effectively reduce BLLs to less than 25 ug/dL.
- ii. If at any time during testing, a blood lead level of 25 ug/dL or greater is detected, the employee shall be given the option of a physical examination by a physician. Contractors shall ensure that all physicians conducting blood monitoring shall have all samples analyzed by an OSHA approved lab that has demonstrated proficiency in blood lead analysis. A list of approved labs can be obtained from OSHA.<sup>9</sup>

Certified copies of all blood lead level results shall be forwarded to the DOT no later than 5 days after receipt. In order to protect the privacy of workers, individual names and social security numbers shall not be included in the information sent to the DOT.

## **2. Products**

Abrasive blasting with abrasive containing crystalline silica can cause serious or fatal respiratory disease.<sup>10</sup> The use of abrasive containing more than 1% crystalline silica is prohibited. Lead-

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<sup>9</sup>To obtain a current list of the approved labs contact: John Germ, OSHA Salt Lake Technical Center Blood Lead Program, 801-524-7925/FAX 524-6660.

<sup>10</sup>DHHS. (1992) Preventing silicosis and deaths from sandblasting. National Institute for Occupational Safety and Health. Publication No. 92-102.

based paints shall not be used in new coating applications.<sup>11</sup> The contractor shall be aware that abrasive media might contain heavy metals such as arsenic, manganese, chromium, cadmium, copper and magnesium.<sup>12,13</sup> Potential exposure hazards related to the use of chemical products, including new paint coatings, must be evaluated by the IH and effective controls must be instituted.

### **3. Execution**

#### **a) Engineering and Work Practice Controls**

Engineering and work practice controls shall be the primary control methods to limit exposure to lead and other occupational hazards. Construction tasks common to bridge rehabilitation and maintenance which have been associated with high lead exposure include torch-cutting, rivet busting and surface preparation of lead-painted steel surfaces with abrasive blasting or power tool methods.

Where feasible, preference shall be given to those paint removal and surface preparation methods which capture debris at the source. Lead-based paint shall be sufficiently removed from surfaces prior to welding or torch cutting to ensure that the temperature of un-stripped metal is not appreciably raised.

All power tools used for paint removal shall be equipped with vacuum shrouds which capture fine dust at the point and time of generation, and transport the dust to collection systems equipped with HEPA filters. Such tools include needle guns, scrapers, and roto peelers. Extended handles should be used on cutting tools whenever possible to reduce exposure. Ongoing evaluation of engineering controls shall be incorporated into the contractor's exposure assessment strategy and monthly reports.

#### **b) Respiratory Protection Program**

The contractor shall implement a written respiratory protection program in accordance with the provisions of 29 CFR 1910.134 and 29 CFR 1926.62(f). Until exposure assessment is complete, the minimum respiratory protective equipment shall be selected based upon the task that a worker performs as specified in 29 CFR 1926.62(d).

These requirements can be modified if, and only if, the IH can verify that exposures permit the use of other less protective respirators. Contractors must supply workers with respirators that are

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<sup>11</sup> There is not a set standard for industrial use of lead based paint at this time. In a memo dated Jun 14, 1993, the Federal Highway Administration prohibited the use of lead paint on Federal aid projects authorized after June 1, 1993.

<sup>12</sup> Adley, D & Trimmer, K. Evaluation of Substitute Materials for Silica Sand in Abrasive Blasting. Journal of Protective Coatings and Linings, Aug. 1999.

<sup>13</sup> OSHA (3/11/96) Special Emphases Program: Lead in Construction, CPL 2,105.

NIOSH and MSHA certified at no expense to the worker.

**c) Hygiene Facilities and Practices**

The Contractor shall provide at no cost to the employee:

1) Hygiene Facilities. Showers shall be provided and equipped with hot and cold water. Hand washing facilities shall be provided in accordance with 29 CFR 1926.51 and shall be readily accessible in the immediate work area. Hygiene facilities must conform to the requirements specified in 29 CFR 1910.141, the OSHA Sanitation Standard.

Washing facilities shall be equipped with clean, hot and cold water, soap and disposable towels which the workers will use to wash their hands and faces before eating, drinking or smoking and after each work shift.

2) A clean area for eating, drinking and smoking. Smoking, eating and drinking in lead contaminated areas shall be prohibited.

3) A separate clean change room equipped with wash up facilities and separate lockers for work and street clothes. No street clothing shall be worn in contaminated areas.

4) Protective clothing and equipment and provisions for cleaning. In accordance with 29 CFR Part 1926.62, clean work clothes must be provided at least weekly to all employees whose exposure levels are above the PEL and daily to those above 200 ug/m<sup>3</sup> as an 8-hour TWA. Protective clothing and equipment must be repaired or replaced as needed to maintain its effectiveness. Protective clothing and equipment must be removed at the completion of a work shift only in change areas provided for that purpose. Contaminated clothing is to be cleaned, laundered or disposed of and shall be placed in a closed labeled container. Persons responsible for handling contaminated clothing shall be informed of potential hazards. At no time shall lead be removed from protective clothing or equipment by any means that will put lead into the work area, such as brushing, shaking, blowing or using a regular vacuum cleaner. All protective clothing and equipment must remain on the work site, and thus cannot be worn home.

5) Workers shall be allowed sufficient pre-job preparation time to change into protective clothing and sufficient clean-up time as part of the work day.

**d) Training**

All employees and supervisors prior to the start of work shall have been trained in General Construction Safety and Health, such training shall be at a minimum equivalent to the OSHA 10 hour construction course. In addition, all employees shall have received lead specific training, which at a minimum, shall satisfy existing federal and state regulations.

The employer must have a written plan developed for conducting employee training of lead hazards in accordance with 29 CFR 1926.62(l). The training will cover, at a minimum:

- \* The content of the Interim Lead Standard and its appendices;
- \* The sources and degree of lead exposure associated with specific tasks;
- \* The purpose, proper selection, fitting, use and limitations of respirators;
- \* The purpose and description of medical surveillance and medical removal protection including the health effects of lead;
- \* Engineering controls and work practices associated with the employee's job assignment including site-specific measures to reduce lead exposure;
- \* The contents of the LHASP;
- \* Instructions that chelating agents should never be used except under the direction of a licensed physician and never as a routine method of removing lead from the body;
- \* The right of employees and their designated representatives to exposure and medical records in a timely manner as specified in 29 CFR 1910.20.

Training content and duration must comply with federal, state and local standards.

Documentation which verifies that training for workers and supervisors is current and valid must be on site at all times. Contractors must utilize workers and supervisors who have been trained in programs which have been accredited by the appropriate state or federal agency. Training must be presented in a language that is understandable to workers and shall include at least 24 hours of classroom instruction and 8 hours of hands-on training involving trade-specific activities. Classroom instruction shall be conducted in an area with seating for all workers, provisions for audio-visual aids and surfaces for writing.

e) **Worker Exposure Assessment**

The contractor shall establish and follow an exposure assessment strategy in accordance with 29 CFR 1926.62(d) which includes:

- ? Estimating personal exposure levels to airborne lead among employees;
- ? Measuring the effectiveness of engineering controls and determining the Adequacy of personal protective equipment;

- ? Verifying that lead dust is not carried off-site on personal belongings and that areas designated as “clean” such as eating areas or decontamination facilities in which street clothes are stored are not lead contaminated; and
- ? Assessing any change in operations or procedures that may affect exposure levels.

1) Air monitoring. The contractor’s exposure assessment strategy shall be in writing, and must accompany all reports containing air sampling results. Multiple randomly collected samples should be obtained by qualified personal at a regular frequency for each job classification. All air monitoring and analysis must be performed in accordance with NIOSH approved methods.

2) Wipe sampling. Because even small amounts of lead ingested from hand-to-mouth contact can contribute to total body burdens of lead and because surface lead dust can easily become airborne, it is important to assess contamination of surfaces. Wipe sampling shall be used to assess potential contamination in areas which should be free of contamination.<sup>14</sup> Clean areas, such as change rooms and eating areas shall not exceed 200 micrograms of lead per square feet of surface area. Surfaces with lead contamination in excess of this criteria shall be cleaned by HEPA vacuuming followed by wet wiping. Wipe sampling, in accordance with NIOSH method 0700 is required at the beginning of the job, and monthly thereafter, depending upon the blood lead results and the observations made by the IH.

3) Until exposure assessment is complete, respiratory protection based on presumed task-based exposures defined in 29 CFR 1926.62(d)(2) shall be provided to employees.

#### 4. Basis of Payment

All elements of the contractor’s safety and health plan shall be paid for as:

- a) **Firm Fixed Price Contracts:** This type of contract is for goods or services at a lump sum or set price which is not subject to change (unless the delivery or scope of work is changed). It places the maximum risk upon the contractor for cost effective performance. It is used to acquire services which can be reasonably defined; or
- b) **Cost Reimbursable or Cost Plus Contracts:** Cost Reimbursable Contracts provide for the reimbursement of actual costs incurred in the performance of the scope of work or statement of work under the contract. The reimbursements of these costs are limited by established procurement regulations as well as the contract document. The Contract will set forth cost ceilings below which the government will reimburse the Allowable Costs incurred. This type of contract will be used only when uncertainties involved in contract

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<sup>14</sup> While there are currently no Federal standards for lead in surface dust, the Department of Housing and Urban Development (HUD) sets a clearance level of 200 ug/ft<sup>2</sup> for floors. OSHA Compliance Directive CPL 2-2.58 - 29 CFR 1926.62, Lead Exposure in Construction (1993) uses this criteria for determining whether an employer has maintained surfaces free of contamination.

performance do not permit the establishment of estimated costs with sufficient accuracy to use firm fixed price type contracts. Under Cost-plus Fixed Fee (CPFF) the contractor agrees to perform the statement of work within the cost ceilings negotiated plus a fee which is fixed in definite dollar amount at the time of contract award or negotiated.

## 5. Information Resources

The following resources may provide useful guidance for developing a LHASP. Their inclusion in these specifications is for reference only and not to be interpreted as a requirement.

*A Compliance Checklist for Monitoring Implementation of the CPWR Model Contract Specifications for the Protection of Workers from Lead on Steel Structures.* J. Gittleman and D. Valiante (1998). The Center to Protect Workers' Rights, 8484 Georgia Ave., Suite 1000, Silver Spring, MD. 20910. 301-578-8500. Report OSH1-98.

*An Invitation to Join in the Evaluation of Model Specifications for the Protection of Workers from Lead on Steel Structures* video. The Center to Protect Workers' Rights, 8484 Georgia Ave., Suite 1000, Silver Spring, MD. 20910. 301-578-8500.

*Avoiding Lead-Based Paint Hazards on Bridges and Other Steel Structures* (1994). A Report to the Federal Highway Administration. Alliance To End Childhood Lead Poisoning, 227 Massachusetts Avenue, N.E., #200, Washington, DC 20002.

*Implementing Lead-Safe Work Practices for Steel Structures: Transportation Agency Policies in 12 States.* P. Erville (1995). The Center to Protect Workers' Rights, 8484 Georgia Ave., Suite 1000, Silver Spring, MD. 20910. 301-578-8500. Report OSH1-96.

*Industrial Lead Paint Removal Handbook* 2nd Edition. K. Trimber (1991). Steel Structures Painting Council, 4516 Henry St., Suite 301, Pittsburgh, PA 15213. SSPC 93-02.

*Lead Control Guide for Bridges and Steel Structures - Protecting Workers During Rehabilitation and Demolition.* N. Clark and M. Goldberg (1998). Mount Sinai-Irving Selikoff Center for Occupational and Environmental Medicine, New York, N.Y. Contact Mount Sinai CHEP, Box 1057, 1 Gustave L. Levy Place, NY, NY, 212-241-7573/FAX 212-987-6407 for ordering information.

*Minimum Criteria for Hazardous Waste Operations and Emergency Response Training Programs* NIEHS (1991). National Clearing House for Worker Safety and Health Training for Hazardous Materials, Waste Operations, and Emergency Response. George Meany Center for Labor Studies, 10000 New Hampshire Avenue, Silver Spring, MD 20903, 301-431-5425.

*The 100 Most Frequently Cited OSHA Construction Standards in 1991: A Guide for the Abatement of the Top 25 Associated Physical Hazards* (1993). U.S. Department of Labor, Occupational Safety and Health Administration. For sale by U.S. Government Printing Office, Superintendent of Documents, Mail Stop SSOP, Washington, D.C. 20402-9328.

*Occupational Blood Lead Surveillance of Construction Workers: Health Programs in Twelve States.* M. Goldberg; C. Roelofs; J. Weiner; and D. Nagin (1995). The Center to Protect Workers' Rights, 8484 Georgia Ave., Suite 1000, Silver Spring, MD. 20910. 301-578-8500. Report OSH2-96.

*Occupational Blood Lead Surveillance of Construction Workers, II: Health Programs in Thirteen States.* M. Goldberg; et al (1997). The Center to Protect Workers' Rights, 8484 Georgia Ave., Suite 1000, Silver Spring, MD. 20910. 301-578-8500. Report OSH1-97.

*Preventing Lead Poisoning in Construction Workers* (1992). National Institute for Occupational Safety and Health, 4676 Columbia Parkway, Cincinnati, OH 45226, 513- 533-8287.

*Preventing Silicosis and Deaths from Sandblasting* (1992). National Institute for Occupational Safety and Health, 4676 Columbia Parkway, Cincinnati, OH 45226, 513-533-8287.

*Protecting Workers and their Communities from Lead Hazards: A Guide for Protective Work Practices and Effective Worker Training* (1993). Society for Occupational and Environmental Health, 6728 Old McLean Village Drive, McLean, VA 22101.

*Working with Lead in the Construction Industry* OSHA 3142 (1993). U.S. Department of Labor, Occupational Safety and Health Administration. Call OSHA Publications Office, 202-219-4667 or write to Publications Office, Room N3101, Department of Labor, 200 Constitution Ave. NW., Washington, D.C. 20210.

## **6. References**

DHHS (1990). *Healthy People 2000: National Health Promotion and Disease Objectives*. Washington, DC: US Dept. of Health and Human Services, Public Health Service, DHHS Publication No. (PHS) 91-50212.

Federal Register (1993). Volume 58, Number 84, May 4, 1993.

USDOL (1991). OSHA List of laboratories approved for blood lead analysis.

## IV. Additional Resources

### A. Building Trades Unions

International Association of Heat and Frost Insulators  
and Asbestos Workers  
1776 Massachusetts Avenue, NW, #301  
Washington DC 20036  
Tel: 202-785-2388  
Fax: 202-429-0568

International Brotherhood of Boilermakers, Iron Ship  
Builders, Blacksmiths, Forgers and Helpers  
735 State Avenue #565  
Kansas City, KS 66101  
Tel: 913-371-2640  
Fax: 913-281-8101

International Union of Bricklayers  
and Allied Craftworkers  
1776 Eye St., N.W.  
Washington DC 20006  
Tel: 202-783-3788  
Fax: 202-393-0219

United Brotherhood of Carpenters  
and Joiners of America  
50 F Street, NW 7<sup>th</sup> Floor  
Washington DC 20001  
Tel: 202-546-6206  
Fax: 202-543-5724

International Brotherhood of Electrical Workers  
1125 15<sup>th</sup> Street, NW  
Washington DC 20005  
Tel: 202-833-7000  
Fax: 202-728-7659

International Union of Elevator Constructors  
5565 Sterrett Place, Suite 310  
Columbia, MD 21044  
Tel: 410-997-9000  
Fax: 410-997-0243

Labourers' International Union of North America  
905 16<sup>th</sup> Street, NW  
Washington DC 20006  
Tel: 202-737-8320  
Fax: 202-737-2754

International Union of Operating Engineers  
1125 17<sup>th</sup> Street, NW  
Washington DC 20036  
Tel: 202-429-9100  
Fax: 202-778-2619

Operative Plasterers' and Cement Masons'  
International Association of the United States and  
Canada  
14405 Laurel Place, Suite 300  
Laurel, MD 20708  
Tel: 301-470-4200  
Fax: 301-470-2502

International Union of Painters  
and Allied Trades  
1750 New York Avenue, NW  
Washington DC 20006  
Tel: 202-637-0700  
Fax: 202-637-0771

United Union of Roofers, Waterproofers  
and Allied Workers  
1660 L Street, NW, Suite 800  
Washington DC 20036-5603  
Tel: 202-463-7663  
Fax: 202-463-6906

Sheet Metal Workers' International Association  
1750 New York Avenue, NW  
Washington DC 20006  
Tel: 202-783-5880  
Fax: 202-662-0894

International Association of Bridge, Structural,  
Ornamental and Reinforcing Iron Workers  
1750 New York Ave., N.W., #400  
Washington, DC 20006  
Tel: 202-383-4800  
Fax: 202-638-4856

International Brotherhood of Teamsters  
25 Louisiana Avenue, NW  
Washington DC 20001  
Tel: 202-624-6800  
Fax: 202-624-8106

United Association of Journeymen and Apprentices of  
the Plumbing and Pipe Fitting Industry of the  
United States and Canada  
901 Massachusetts Avenue, NW  
Washington DC 20001  
Tel: 202-628-5823  
Fax: 202-347-4938

## B. NIOSH Educational Resource Centers

ALABAMA EDUCATION AND RESEARCH CENTER  
University of Alabama at Birmingham  
School of Public Health  
RPHB 120  
1530 3rd Avenue South Birmingham, AL 35294-0022  
(205) 934-6208  
Fax: (205) 975-5484  
E-mail: oestensk@uab.edu  
R. Kent Oestenstad, Ph.D., Director

ILLINOIS EDUCATION AND RESEARCH CENTER  
School of Public Health  
2121 West Taylor Street, Rm. 215  
Chicago, IL 60612-7260  
(312) 996-7887  
Fax: (312) 413-7369  
E-mail: dhryhorc@uic.edu  
Daniel O. Hryhorczuk, M.D., M.P.H., Director

CALIFORNIA EDUCATION AND RESEARCH  
CENTER - NORTHERN  
University of California at Berkeley  
School of Public Health  
140 Warren  
Berkeley, CA 94720-7360  
(510) 642-0761  
Fax: (510) 642-5815  
E-mail: spear@uclink2.berkeley.edu  
Robert C. Spear, Ph.D., Director

JOHNS HOPKINS EDUCATION AND RESEARCH  
CENTER  
Johns Hopkins University  
School of Hygiene and Public Health  
615 North Wolfe Street  
Baltimore, MD 21205  
(410) 955-4037  
Fax: (410) 955-1811  
E-mail: jagnew@jhsph.edu  
Jacqueline Agnew, Ph.D., Director

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CALIFORNIA EDUCATION AND RESEARCH  
CENTER - SOUTHERN

University of Southern California  
School of Medicine  
Department of Preventive Medicine  
1540 Alcazar Street, Suite 236  
Los Angeles, CA 90033  
(323) 442-1096  
Fax: (323) 442-3272  
E-mail: [jpeters@hsc.usc.edu](mailto:jpeters@hsc.usc.edu)  
John M. Peters, M.D., Director

CINCINNATI EDUCATION AND RESEARCH  
CENTER

University of Cincinnati  
Department of Environmental Health  
P.O. Box 670056  
Cincinnati, Ohio 45267-0056  
(513) 558-1749  
Fax: (513) 558-2772 or 4397  
E-mail: [clarkcs@E-mail.uc.edu](mailto:clarkcs@E-mail.uc.edu)  
C. Scott Clark, Ph.D., P.E., CIH, Director

HARVARD EDUCATION AND RESEARCH CENTER

Harvard School of Public Health  
Department of Environmental Health  
665 Huntington Avenue  
Boston, MA 02115  
(617) 432-3323  
Fax: (617) 432-0219  
E-mail: [dchris@hohp.harvard.edu](mailto:dchris@hohp.harvard.edu)  
David C. Christiani, M.D., Director

MIDWEST HEARTLAND CENTER FOR  
OCCUPATIONAL SAFETY & HEALTH

University of Iowa  
Oakdale Campus, 108IREH  
Iowa City, IA 52242-5000  
(319) 335-4415  
Fax: (319) 335-4225  
E-mail: [nancy-sprince@uiowa.edu](mailto:nancy-sprince@uiowa.edu)  
Nancy Sprince, M.D., M.P.H., Director

MICHIGAN EDUCATION AND RESEARCH CENTER

University of Michigan  
College of Engineering  
Dept. of Industrial and Operations  
Engineering Building  
1205 Beal Avenue  
Ann Arbor, MI 48109  
(734) 763-0563  
Fax: (313) 764-3451  
E-mail: [wmkeyser@umich.edu](mailto:wmkeyser@umich.edu)  
W. Monroe Keyserling, Ph.D., Director

MINNESOTA EDUCATION AND RESEARCH  
CENTER

University of Minnesota  
School of Public Health  
Box 807, Mayo Memorial Building  
Minneapolis, MN 55455  
(612) 626-4855  
Fax: (612) 626-0650  
E-mail: [igreaves@cccs.umn.edu](mailto:igreaves@cccs.umn.edu)  
Ian A. Greaves, M.D., Director

NEW YORK/NEW JERSEY EDUCATION AND  
RESEARCH CENTER

Mt. Sinai School of Medicine  
Department of Community and Preventive Medicine  
P.O. Box 1057  
One Gustave L. Levy Pl.  
New York, NY 10029-6574  
(212) 241-4804  
Fax: (212) 996-0407  
E-mail: [p\\_landrigan@smtplink.mssm.edu](mailto:p_landrigan@smtplink.mssm.edu)  
Philip J. Landrigan, M.D., M.Sc., Director

UTAH EDUCATION AND RESEARCH CENTER

University of Utah  
Rocky Mountain Center for Occupational  
and Environmental Health  
75 /siytg 2000 East  
Salt Lake City, UT 84112-5120  
(801) 581-8719  
Fax: (801) 581-7224  
E-mail: [rmoser@rmcoeh.utah.edu](mailto:rmoser@rmcoeh.utah.edu)  
Royce Moser, Jr., M.D., M.P.H., Director

NORTH CAROLINA EDUCATION AND RESEARCH CENTER

University of North Carolina  
School of Public Health  
Rosenau Hall, CB# 7400  
Chapel Hill, NC 27599-7410  
(919) 966-3473  
Fax: (919) 966-7911  
E-mail: mike\_flynn@unc.edu  
Michael R. Flynn, Sc.D., Director

TEXAS EDUCATION AND RESEARCH CENTER

University of Texas Health Science  
Center at Houston  
School of Public Health  
P.O. Box 20186  
Houston, TX 77225-0186  
(713) 500-9459  
Fax: (713) 500-9442  
E-mail: GDelclos@sph.uth.tmc.edu  
George L. Delclos, M.D., Director

SOUTH FLORIDA EDUCATION AND RESEARCH CENTER \*

University of South Florida  
College of Public Health  
13201 Bruce B. Downs Blvd., MDC Box 56  
Tampa, FL 33612-3805  
(813) 974-6626  
Fax: (813) 974-4986  
E-mail: sbrooks@com1.med.usf.edu  
Stuart M. Brooks, M.D., Director

WASHINGTON EDUCATION AND RESEARCH CENTER

University of Washington  
Department of Environmental Health  
P.O. Box 357234  
Seattle, WA 98195-7234  
(206) 685-3221  
Fax: (206) 543-9616  
E-mail: mmorgan@u.washington.edu  
Michael S. Morgan, Sc.D., Director

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C. Industrial Hygiene and Occupational Health Professional Associations

State, County and Municipal health agencies may be able to assist you in locating industrial hygienists and occupational physicians in your area. In addition, the following associations may be helpful in obtaining technical support:

American Conference of Governmental Industrial Hygienists  
6500 Glenway Ave., Bldg. D-7, Cincinnati, OH 45211-4438  
(513) 661-7881.

American Industrial Hygienists Association  
2700 Prosperity Ave., Suite 250, Fairfax, VA 22031  
(703) 849-8888, FAX 207-3561.

Association of Occupational and Environmental Clinics  
1010 Vermont Ave., NW, #513, Washington, DC 20005  
(202) 347-4976, FAX 347-4950.

American College of Occupational and Environmental Medicine  
55 West Seegers Road, Arlington Heights, IL 60005  
(708) 228-6850, FAX 228-1856.

D State Contacts for the Adult Blood Lead Epidemiology and Surveillance (ABLES) Program, 2002

State (mcg/dL)	Principal Investigator	Other Contacts	Phone	Facsimile
Alabama (15)	J. P. Lofgren		334/206-5971	334/206-5967
Arizona (10)	Will Humble	Patty Arreola (5943)	602/230-5830	602/230-5933
California (25)	Barbara Materna	Payne (4284)/Hipkins(4262)/Harrington (4335)	510/622-4343	510/622-4310
Connecticut (all)	Renee Coleman-Mitchell	Carolyn Webb, (7744) Deborah Pease (7771)	860/509-7730	860/509-7785
Florida (10)	David Johnson	Trina Thompson (4444)	850/245-4299	850/922-8473
Georgia (unk)	Stic Harris		404/463-3748	404/657-2608
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