

**THE
CENTER
TO
PROTECT
WORKERS'
RIGHTS**

CPWR

**A Compliance Checklist for Monitoring Implementation of the
CPWR *Model Contract Specifications for
The Protection of Workers from Lead on Steel Structures***

**Janie Gittleman
Allegheny University of the Health Sciences
MCP*Hahnemann School Of Medicine
Department of Community and Preventive Medicine**

**David Valiante
New Jersey Department of Health & Senior Services
Occupational Disease and Injury Services**

April 1998

The Center to Protect Workers' Rights
Suite 1000 • 8484 Georgia Ave. • Silver Spring, MD 20910
301-578-8500 • Fax: 301-578-8572 • www.cpwr.com • www.elcosh.org

This report was produced under contract to the Center to Protect Workers' Rights. The contract, totaling \$20,000, was supported by grant number UO2/CCU310982 from the National Institute for Occupational Safety and Health (NIOSH). The report's contents are solely the responsibility of the authors and do not necessarily represent the views of NIOSH.

© Copyright 1998, The Center to Protect Workers' Rights. All rights reserved.
For copies or for permission to reproduce this document, please contact
CPWR, 5th floor, 111 Massachusetts Ave. NW, Washington, D.C., 20001,
202-962-8490 or <http://www.cpwr.com> (report OSH1-98).

Readers of this report may also want to consult *Model Contract Specifications for the Protection of Workers from Lead on Steel Structures*, 1993, draft 1996 update, available free of charge from Publications, The Center to Protect Workers' Rights (CPWR).

Three other reports may be useful:

Erville, Pierre. 1996. *Implementing Lead-Safe Work Practices for Steel Structures: Transportation Agency Policies in Twelve States*. (California, Connecticut, Georgia, Louisiana, Maryland, Massachusetts, Michigan, New Jersey, New York, Ohio, Texas, and Washington)

Goldberg, Mark, Cora Roelofs, Jean Weiner, and Deborah Nagin. 1996 *Occupational Blood Lead Surveillance of Construction Workers: Health Programs in Twelve States*. (California, Connecticut, Georgia, Louisiana, Maryland, Massachusetts, Michigan, New Jersey, New York, Ohio, Texas, and Washington)

———. 1997. *Occupational Blood Lead Surveillance of Construction Workers, II: Health Programs in Thirteen States*. (Alabama, Alaska, Florida, Idaho, Indiana, Kentucky, Mississippi, North Carolina, Oregon, Pennsylvania, South Carolina, Tennessee, and West Virginia)

Each report is available for \$5 postpaid from the Center to Protect Workers' Rights.

Acknowledgments

In addition to those people listed in annex A who provided their insight and helpful suggestions, the authors would like to thank Kathleen O'Leary, Martha Stanbury, Barbara Gerwel, Judith Klotz, and Ed Mallerick, all of the New Jersey Department of Health and Senior Services Program. Frank Wade, of the New Jersey State Building and Construction Trades Council, supported the project from its inception, as did Tony Pellegrino of the New Jersey Department of Transportation (NJDOT). Ralph Baliunas, also from NJDOT, was particularly helpful in supervising the authors' access to sites in the state. Pam Susi and Pete Stafford of the Center to Protect Workers' Rights provided encouragement and guidance.

Contents

Background, *Page iii*

The action research team, *v*

Model Specs Checklist, 1

Checklist Development and Evaluation, *10*

Development, *10*

Reviewer feedback, *10*

Field observations, *13*

Conclusions and Recommendations, *15*

References, *16*

Annexes, *17*

A. Action Research Team Checklist Reviewers

B. OSHA Certified Laboratories for Lead Analysis

C. State Lead Registries' Reporting Levels and Contacts (ABLES program)

D. Daily Worksite Inspection Checklist

Abbreviations, *Inside back cover*

Background

State-government lead surveillance data indicate construction workers have some of the highest blood lead levels of any occupational group in the United States (Gerwel, Valiante, Pescatore, and Stanbury 1993; Israel, Shurman, and Hugentobler 1992; Centers for Disease Control 1992 and 1993). Between 1985 and 1994, approximately 5,000 individuals were reported to a blood lead registry maintained by the Occupational Health Program of the New Jersey Department of Health. Construction workers made up one-third of the reports of elevated blood lead levels, levels greater than or equal to 25 micrograms per deciliter of blood ($\geq 25 \mu\text{g/dL}$). More than 350 construction workplaces in New Jersey have also been identified from case reports to the state Adult Blood Lead Epidemiology and Surveillance (ABLES) program. These data are passed on to the federal ABLES program of the National Institute for Safety and Health (NIOSH). NIOSH tracks elevated blood lead levels nationwide and publishes them in *Morbidity and Mortality Weekly Report*.

In 1991, the state Department of Health began meeting with the New Jersey Department of Transportation to address the problem of seriously elevated blood lead levels in workers at bridge construction sites in New Jersey. These discussions resulted in the inclusion of lead safety-and-health language in contracts awarded by the state transportation agency to bridge painting and repair contractors, beginning in 1993. The state Department of Transportation referred to the inclusion of lead safety and health language in contract specifications as the “Lead Health and Safety Plan” (LHASP). Requirements in this plan exceeded the requirements of the OSHA Interim Standard for Lead in Construction by requiring monthly blood lead level testing for all workers. (the OSHA standard, 29 CFR 1926.1025, took effect June 3, 1993.) In addition, the state Department of Transportation specified in its LHASP that contractors conducting lead abatement on steel structures use OSHA-approved laboratories in New Jersey for all blood lead analysis. This provision was intended to ensure reporting to the state lead registry and enable the New Jersey Department of Health to monitor workers’ blood lead levels at the construction sites.

Surveillance data available on construction workers in New Jersey and Connecticut have also shown that many workers continue to be overexposed to lead, with air and blood lead levels exceeding regulatory requirements (Whelan and others 1997; Gittleman and others 1994). At the same time, however, preliminary findings show some decline in blood lead levels among some construction workers. One recent study by the New Jersey Department of Health examined blood lead test results from 6 major bridge painting contractors on 156 individuals. Blood lead levels among these workers showed average blood lead levels of $44 \mu\text{g/dL}$ in 1992 and $35 \mu\text{g/dL}$ in 1994. Data from the Connecticut Road Industry Surveillance Project (CRISP) have documented reductions in worker blood lead levels by specifying lead-specific worker protections in contract language (Maurer 1995).

More recently, three surveys have described the nature and scope of state-based programs to monitor occupational blood lead levels of workers and to set policies for worker protection in Department of Transportation projects (Goldberg, Roelofs, Weiner, and Nagin 1996 and 1997; Erville 1996). Findings from these reports suggest that implementation of the OSHA lead standard has increased awareness of lead exposure in the construction industry. However, only 4 of 12 states surveyed

reported implementing lead health-and-safety contract specifications (Centers for Disease Control and Prevention 1993, 12). Worker training and contractor certification programs are not yet federally sanctioned, so training requirements vary from state to state. Furthermore, state transportation agencies do not receive blood-lead-level reports, which means the agencies do not know enough about whether and how well workers are protected from lead exposures at highway-construction sites (Walker, Osorio, Maizlish, and Royce 1992; Golberg, Roelofs, Weiner, and Nagin 1996 and 1997).

Existing surveillance data, along with an increase in state- and federally mandated lead abatement, have prompted increased concern for lead-exposed construction workers. Working with a large group representing labor, management, and government agencies in health and transportation, the Center to Protect Workers' Rights, CPWR, developed *Model Specifications for the Protection of Workers from Lead on Steel Structures* (1993). The intent was to provide contract guidelines that could be adapted for use throughout the country. The specifications must be field tested, however, to determine their effectiveness as an intervention strategy for protecting workers engaged in lead-based paint abatement.

The compliance checklist provided here (pages 1-10) is intended as a comprehensive tool to assist construction owners, contractors, and health and safety specialists with monitoring the implementation of lead safety and health language now appearing in state bridge and highway paint and lead abatement contracts. The checklist provides guidance to prompt attention to elements that are crucial to a successful program for lead health and safety — from a project's initial planning phase through the hiring of contractor personnel and contract implementation.

The checklist is based on a draft 1996 update of CPWR model specifications, the New Jersey Department of Transportation's lead health and safety plan, and the OSHA Compliance Directive for the Interim Standard for Lead in Construction (CPL 2-2.58, March 1996). The checklist will also assist in maintaining compliance with the requirements of the OSHA Interim Standard for Lead in Construction. A Daily Worksite Inspection Checklist was also developed to assist the on-site safety person (either the owner, contractor hired competent person, construction safety and health specialist, and owner hired resident engineers/inspectors) with comprehensive monitoring of the construction site for lead related health and safety hazards.

The action research team

In June of 1996, a preliminary action research team was convened consisting of researchers at the Allegheny University of the Health Sciences, MCP*Hahnemann School of Medicine, the New Jersey Department of Health, and representatives from the New Jersey Department of Transportation (this agency is the owner/authority for bridges and many highway overpasses in the state (annex A). This working group provided input into the development of the checklist and facilitated the process of identifying owners, contractors, and other related agency staff who could provide suggestions for improving the checklist's usefulness.

The action-research-team approach was used because of its ability to promote innovative new ideas and foster productive relationships among researchers and members of organizations ultimately responsible for the protection of the construction workforce (construction owners, contractors, and health and safety specialists). The team approach is participatory, involving cooperation among different organizational representatives. The process involves co-learning among the participants. Use of this process is intended to empower the participants and to achieve balance between research and action (Israel, Shurman, and Hugentobler 1992).

Recently, Ventura and Susi (1996) reported findings from a pilot project involving use of the action-research-team approach and the CPWR model specifications at National Aeronautics and Space Administration (NASA) in Cleveland, Ohio. The model specifications were implemented at NASA's Lewis Research Center as part of a total lead abatement job involving the renovation of three large gas storage tanks at three locations on the property. An action research team was convened to ensure the model contract specifications were followed, evaluate the performance of the specifications, and review issues such as the role of the health and safety officer, owner responsibilities, safety and health committees, and health hazards. The project helped identify language in the model specifications requiring further clarification (such as, qualifications of the construction safety and health specialist) and omissions that should be included in future contracts (for instance, the need for joint safety and health committees and craft-specific representation at meetings).

Feedback from reviewers of the Action-Research-Team Checklist for the New Jersey project is described in the following section and builds on previous efforts to improve the CPWR model contract specifications aimed at achieving safe and healthful worksites and "facilitating greater communication and proactive approaches to injury and illness prevention" on construction projects (Goldberg, Roelofs, Weiner, and Nagin 1996).

A Compliance Checklist for Monitoring Implementation of The CPWR Model Contract Specifications for The Protection of Workers From Lead on Steel Structures

I. Preliminaries

A. Job Planning: *Owner responsibilities*

- Designate qualified Health & Safety Planning Coordinator (owner representative)
- Identify and document site-specific hazards
- Develop plan to coordinate start-up information between state health, transportation, and labor agencies to monitor performance of contractor and intervene when necessary
- Include contract language to withhold payment or remove contractors from the job site who fail to comply with written Health and Safety Plan

B. Pre-Bid Meetings: *Owner responsibilities*

- Inform contractors' of the presence of lead paint leading to potential lead exposure and minimum requirements for hazard control
- Discuss worker, community, environmental protection measures
- Discuss requirements of Lead Health & Safety Plan and submittal
- Discuss expectations for contractor performance and enforcement procedures

C. Pre-Qualification and Contractor Selection: *Owner responsibilities*

- Notification to contractors of training certification regulations (such as the Society for Protective Coatings [SSPC], Qualifications Programs 1 and 2 certifications)
- Selection of contractor's with "demonstrated" past performance capability on lead painted structures indicating no hazard to employees, the public, or environment

past performance evaluation criteria:

- Health & Safety Programs of previous lead projects
- Evidence of prior Serious or Willful OSHA Citations
- Workers' Compensation Ratings
- Experience Modification Rating (EMR)
- OSHA 200 and 101 logs

D. Submittals: *Owner and contractor responsibilities*

Comprehensive Health & Safety Program

- Prospective bidders submit preliminary materials describing the Lead Health & Safety plan
- Does outline of Lead Health & Safety Plan (LHASP) include, at a minimum, the following categories?:
 - General introduction
 - Lead health & safety organization and responsibilities
 - Exposure monitoring for lead and other known hazards
 - Engineering and administrative controls
 - Respiratory protection
 - Protective work clothing & equipment
 - Hygiene facilities and practices
 - Medical surveillance program (including medical removal protection and worker notification procedures)
 - Decontamination procedures
 - Housekeeping activities to be performed on site
 - Lead specific worker training
 - Record Keeping procedures and forms

Owner bid review evaluates whether contractor personnel have:

- Adequate training
- Technical capability
- Sufficient labor hours estimated to perform functions detailed in Contractor 's LHASP

II. Pre-Construction Phase: Owner responsibilities

A. Verification and approval of contractor's Lead Health & Safety Plan (LHASP)

- Materials (e.g. containment, dust collection equipment, personal protective equipment, hazardous waste containment)
- Procedures (e.g. written standard operating procedures)
- Personnel (e.g. certification cards/ID)

B. Notification of project start-up to appropriate agencies

- Notify appropriate regulatory agencies responsible for worker protection of regulated hazards 10 days prior to Start-Up

III. Construction Phase: Owner responsibilities

- Owners work with state health and labor agencies to monitor contractor performance and intervene when necessary
- Owner designates Project Health & Safety Coordinator to ensure written plan prepared by Planning Coordinator is followed
- Enforcement of project specifications is conducted by Owner personnel or their authorized representative (authorized representative serves as front-line inspector for contract compliance with Lead Health & Safety Plan)

Construction Phase: Owner responsibilities (continued)

- Project Committee (co-chairs joint Safety & Health Committee) established by Contractor, Construction Safety & Health Specialist, Owner's Project Safety & Health Coordinator
- Project Committee meets monthly
- Use of contract provisions to withhold payment or remove contractor for failed compliance with Lead Health & Safety Plan
- Industrial Hygienist (IH) modifies checklist to meet site-specific conditions for use by Department of Transportation (DOT) Inspectors/Resident Engineers
- Medical surveillance program oversight by licensed physician (recommended occupational physician certified by American Board of Preventive Medicine)
- Blood lead level (BLL) data without name or social security number forwarded to DOT and State BLL registry no more than 5 days after receipt of data
- Provides employee notification in writing of BLL results within 5 days of receipt
- Blood Lead Level (BLL) monitoring
 - If BLL \geq 35 $\mu\text{g}/\text{dL}$ for 2 or more workers contractor required to submit plan of corrective action within 1 week of receipt of results
 - If BLL $>$ 50 $\mu\text{g}/\text{dL}$ for any worker % of bid amount should be held until controls have been upgraded to maintain all levels below 50 $\mu\text{g}/\text{dL}$

CPWR WORKING GROUP RECOMMENDED SCHEDULE FOR BLOOD LEAD LEVEL MONITORING

- Baseline of new hire (unless documented proof provided from OSHA approved lab within 2 weeks prior to starting job)
- Workers with baseline $>40 \mu\text{g}/\text{dL}$ on initial sample referred to occupational physician to determine fitness for duty
- Second test: 2 weeks later-all workers
- Third test : 2 weeks later all workers whose second test increase more than 10 $\mu\text{g}/\text{dL}$ from baseline
- Subsequent testing: monthly for 6 months if BLL's are stable and job site operations or work procedures do not change
- If at the end of 6 months BLL's have remained $<25 \mu\text{g}/\text{dL}$ for 3 consecutive months and job site practices do not change, BLL is recommended every two months.
- If at any time a BLL of 25 $\mu\text{g}/\text{dL}$ or greater is detected blood lead level monitoring should be conducted monthly until 3 consecutive tests are below 25 $\mu\text{g}/\text{dL}$
- Exit testing when a worker is terminated should be provided and notification of results should occur within 5 days of receipt of the results
- An increase of 10 $\mu\text{g}/\text{dL}$ from one test to another triggers a worksite evaluation by the Construction Safety and Health Specialist (CSHS) and IH
- If at any time a BLL $>$ 40 $\mu\text{g}/\text{dL}$ is detected, the employee shall be examined by an occupational physician, and such employee should be tested bi-weekly until 2 consecutive tests indicate BLL = $<$ 30 $\mu\text{g}/\text{dL}$
- BLL specimens should be sent by physician to OSHA approved labs for lead analysis

**CPWR WORKING GROUP RECOMMENDED SCHEDULE FOR BLOOD-LEAD LEVEL MONITORING
(continued)**

(see annex B for list of OSHA Certified Laboratories for Lead and Zinc Protoporphyrin Analysis)

- Certified copies of all BLL results should be forwarded to DOT no later than 5 days from receipt of results
- BLL results should be forwarded to state blood lead registry (no later than 5 days of receipt of results (see annex C for list of State Lead Registries and contacts)
- Annual Medical Exam for workers with BLL > 40 µg/dL during the preceding 12 months

IV. Construction Phase: *Contractor responsibilities*

- Implements written LHASP
- Reviews adequacy of the LHASP and changing site conditions
- Implements and oversees worker exposure assessment strategy
- Prepares monthly reports presented to Joint Health & Safety Committee summarizing activities including air, wipe sampling, and BLL monitoring information

Model Specifications

I. General Information

A. Introduction

- Implementation of Lead Health & Safety Plan on any job where employee may be exposed to lead
- Contractor fully responsible for protection of his/her employees and any subcontractor personnel from exposure to lead, as well as other recognized Health & Safety hazards

B. Applicable Documents

- Contractor must comply with requirements of Interim Final Rule for Lead Exposure in Construction (29 CFR 1926.62) of the U.S. Occupational Safety and Health Administration (OSHA)
 - Additional Federal Regulations requiring compliance include:
 - 29 CFR Part 1926.16 Rules of Construction
 - 29 CFR Part 1926.59 Hazard Communication
 - 29 CFR Part 1910.20 Access to Employee Exposure Medical Records
 - 29 CFR Part 1910.134 Respiratory Protection
 - 29 CFR Part 1910.94 Abrasive Blasting
 - 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
 - 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 1910.120 Hazardous Waste Operations & Emergency Response
 - 29 CFR Part 1910.141 Sanitation

C. Definitions

Industrial hygienist qualifications:

Current certification by the American Board of Industrial Hygiene with field and sampling experience (preferably in construction industry)

or

Holds a master's degree from an accredited college or university in the field of engineering, chemistry, physics, biological sciences, industrial hygiene, toxicology, environmental sciences, or related field and have at least two full years of full-time experience as an industrial hygienist

or

Holds a bachelor's degree in the field of engineering, chemistry, physics, biological sciences, industrial hygiene, toxicology, environmental sciences, or related field and have at least three years of experience as an industrial hygienist, including field and sampling experience, preferably in the construction industry

Industrial hygienist activities:

- Develops and oversees implementation of respirator protection program in compliance with 29 CFR 1926.23
- Reviews blood lead level results as necessary with physician to assess effectiveness and controls
- Collaborates with Joint Safety & Health Committee (JSHC), CSHS, physician, and contractor, in placement of personnel with increased blood lead levels
- Reviews checklist used by the CSHS to verify compliance with the LHASP
- Periodically monitors work-site to inform the contractor and JSHC of worksite LHASP deficiencies
- Conducts monthly follow-up training with employees based on input from JSHC
- IH expected to be on site at least once per week during activities associated with air lead exposures in excess of 30 µg/m³
- IH certifies in writing to state DOT that contractor has performed all listed requirements of LHASP, including:
 - Deficiencies found
 - Corrective actions taken
 - Approval for changes to LHASP
 - Informs the DOT of any changes to the LHASP

Construction safety and health specialist qualifications:

The construction safety and health Specialist (CSHS) shall be capable of identifying hazardous or dangerous conditions.

The contractor may train and authorize the CSHS as the "competent person" as defined by 29 CFR Part 1926.32, however, the model specifications do not require that the CSHS serve in this capacity

The individual shall have experience in the construction industry (preferably in highway and bridge rehabilitation), and formal training and experience in safety and health. At a minimum, this experience should include:

- 5 yrs. experience with construction trade
- 32 hours lead abatement training for steel structures
- 30 hours general safety and health training = to OSHA 500 course
- 24 hours construction safety & health specialist training
- capable of hazard identification or dangerous conditions
- CSHS provided adequate duty time (min. 5 hours/week)

- CSHS designated as Chief Safety & Health Steward on union jobs
- On non-union jobs CSHS serves as Chief Safety & Health Representative
- CSHS provided adequate duty time

Construction safety and health specialist activities:

- Implements and monitors daily compliance with the LHASP
- Communicates with JSHC and IH regarding implementation of LHASP and areas needing improvement or problem correction
- Assists IH in exposure assessment activities
- Communicating results of IH monitoring to workers on a regular basis with support of IH as needed
- Ensures daily compliance with respiratory protection program
- Uses inspection checklists under direction of IH [annex D of this report]
- Works with JSHC & IH in implementation and evaluation of interventions and control technology
- Convenes regular tool box talks with workers to address problems and ongoing training on site-specific Health & Safety
- Maintains log of all personnel entering work areas with potential lead exposure by name, social security number, date, time entering and leaving area, task and exposure monitoring data (if collected)

Engineering and work practice controls:

- Engineering and work practice controls instituted to limit exposure to lead and other hazards
- Preference given to paint removal and surface preparation methods which capture debris at the source
- Lead based paint must be removed prior to welding and torch cutting surfaces (29 CFR part 1926.354)
- Paint removal at least 4" from area of heat exposure in enclosed spaces
- Power tools equipped with vacuum shrouds to capture fine dust at point and time of generation and collection systems with HEPA filter should be provided for:
 - *Needle guns
 - *Scrapers
 - *Roto peeners (metal tabs fixed to a leather-like strap on a spinning hub, used to break up paint or other coatings)
 - *Extended handles on cutting tools when possible will decrease exposures

Respiratory protection program:

- IH implements a respiratory protection program in accordance with 29 CFR 1910.134
- Minimum respiratory protection based on task specifications in *Interim Standard for Lead in Construction*
- Respirators approved by NIOSH and MSHA must be supplied to workers

Hygiene facilities and practices:

- IH establishes written personnel hygiene procedure in accordance with 29 CFR 1926.62 para (h) & (l)
The contractor supplies:
 - hygiene facilities and showers
 - hand washing facilities in immediate work area
- CPWR work group and OSHA recommends, showers be mandated where exposure $>50 \text{ ug/m}^3$
- A clean area for eating, drinking, smoking (activities prohibited in lead-contaminated areas)
- Separate clean change room equipped with wash-up facilities and separate lockers for work and street clothes
- Clean work clothes provided weekly to all employees whose exposure levels $> \text{PEL}$ and daily to those above $200 \text{ } \mu\text{g/m}^3$ 8-hour TWA
- Protective clothing and equipment removed at the completion of a work shift only in change areas provided for that purpose
- Contaminated clothing to be cleaned, laundered, and placed in a labeled hazardous waste container
- Persons handling contaminated clothing should be informed of potential hazards
- All protective work clothing must remain on site

Training:

- All workers and foremen shall have been trained in construction safety and health; at a minimum they should receive the OSHA 10-hour construction course and also lead-specific training
- At minimum lead-specific training should satisfy existing federal and state regulations
- Employer must have a written plan developed for conducting employee training for lead hazards in accordance with 29 CFR 1926.62(1)
Training at a minimum:
 - Content of the Interim Standard and Appendices
 - Sources and degree of lead exposure associated with specific tasks
 - Purpose, selection, fitting, use and limits of respirators
 - Purpose and description of medical surveillance and MRP including health effects of lead
 - Engineering controls and work practices associated with employee job assignments (including information on work practices that decrease lead exposure)
 - Contents of the LHASP
 - Instructions that chelating agents should not be used to decrease lead levels unless under direct supervision by a physician
 - Right of employees and designated representatives to medical records in a timely fashion as specified in 29 CFR 1910.20
 - Training content must comply with EPA regulations
 - Documentation must verify training for workers and supervisors is current and valid and must be on-site at all times
 - Contractors utilize workers and supervisors trained in programs accredited by appropriate state and federal agencies
 - Follow-up training (which reviews contents of IH monthly reports) provided by IH or CSHS

Worker exposure assessment:

- Air monitoring - to determine the range of lead concentrations and to measure effectiveness of controls in decreasing airborne concentration of lead
- Minimum sampling one full shift for each job classification/work area (for each shift or shift expected to have highest exposure)
- Samples must be representative of the monitored workers daily exposure
- If exposures are < than OSHA Action Level ($30\mu\text{g}/\text{m}^3$) monitoring may cease
- If exposures are > than OSHA Action Level ($30\mu\text{g}/\text{m}^3$) but < PEL ($50\mu\text{g}/\text{m}^3$) monitoring required every 6 months
- If exposure > PEL monitoring must occur every 3 months
- Additional monitoring required when conditions change
- Workers must receive notification within 5 days after completion of assessment
- When exposure > PEL employers must provide written notice to workers
- Accurate characterization of workers exposures is likely to require collecting multiple randomly selected samples over time for each job classification
- All air monitoring and analysis should be in accordance with NIOSH Approved Methods

Wipe sampling (to collect lead dust):

- Assess contamination of surfaces (such as, change rooms, hygiene facilities, showers, and lunch areas)
- Wipe sampling at beginning of job (monthly) based on BLL results and observations made by the IH
- NIOSH method 0700 provides a valid method for wipe sampling

Site conditions:

- Other hazards that may be associated with work on steel structures include but are not limited to heat stress, noise, ergonomic hazard, heavy metals exposure and falls
- Explicit statement of potential hazards associated with specific project
- Structure-specific information on lead paint concentrations (The Consumer Product Safety Commission designates a concentration for paint application products of less than 0.06% lead by weight for consumer use.)

D. Submittals**Lead health and safety plan**

- Lead hazard prevention program incorporated into larger health and safety program aimed at prevention of occupational exposures
- Lead Health & Safety Plan submitted to the owner (e.g. department of transportation prior to initiation of work and job specific:
- The Plan should also include copy of Interim Lead Standard, Material Safety Data Sheets (MSDSs) for any chemicals used on site
- Training certifications for supervisors and employees should be submitted
- Society for Protective Coatings contractor certifications (through SSPC Qualifications Programs 1 and 2)

- Certifications on site at all times
- Does the written plan at minimum address?:
 - Fall hazards-potential hazards and law addressed prior to Start-up
 - Fall arrest systems- (e.g. body harness)
 - Identification of fall hazards - periodic walk-through inspections
 - Heat stress-ACGIH guidelines
 - Noise-PEL 90 dBA (equipment survey and appropriate selection procurement)
 - Ergonomic hazard identification and control measures (e.g procedures for manual handling of heavy loads, proper tool selection to reduce awkward postures and minimize vibration, and administrative controls such as rest breaks and job rotation)
 - Heavy metals -contractors exposure assessment program should characterize full range of potential metal exposures, appropriate selection of abrasive media, verification of specifications on heavy metal concentrations with spot bulk sample checks
 - Traffic safety.

E. Quality Assurance: Joint Safety & Health Committee

- Owner should establish a joint safety and health committee (JSHC) made up of individual contractors and their employees
- Each craft and sub contractor represented (except for projects less than 1 month long)
- JSHC co-chaired by labor and management
- 50% of JSHC should consist of worker representatives
- Chairs should receive JSHC representative training
- Chairs should be provided adequate preparation time for meetings (1 hour)
- JSHC meetings held regularly (recommended on monthly basis)
- JSHC should be authorized to remove workers from unsafe conditions for reasonable cause due to imminent danger
- The industrial hygienist and CSHS should attend the regular meetings and review relevant reports prior to the meeting
- JSHC should review reports made by safety and health personnel and by contractor
- JSHC should provide input into implementation of site safety and health program.
- Recommendations of the JSHC must be acted on in a timely fashion.

Workers' Trade Committee

- Composed of 1 representative per craft
- On Union jobs representatives designated as Safety Stewards
- Representatives on the Workers' Trade Committee and foreman for sub-contractor conduct walkthrough of a site at least once per week

Checklist Development and Evaluation

Development

The groundwork was laid for identifying a mix of owners, contractors, competent persons, and regulatory agency personnel for review and field testing of the checklist in August and September 1996. The fall and spring months (October 1996 and May 1997) were used to review the CPWR model contract specifications, the New Jersey LHASP, and the OSHA Compliance Directive for the Interim Standard for Lead in Construction before beginning field work. The CPWR model contract language was put into a checklist format spanning the phases of project development.

In June and July 1997, the first draft of the checklist was mailed to members of the action research team. Their feedback was incorporated to improve clarity in a revised version of the checklist. Additional comments and suggestions were sought during site visits to four construction sites in New Jersey during July and August 1997. Site A was a lead abatement job at a bridge spanning the Delaware River between New Jersey and Pennsylvania. Site B was a highway overpass on a major highway in Camden, New Jersey. Site C was a bridge over an inlet on the New Jersey coast and site D was an overpass on a major highway in Newark, New Jersey. The Daily Worksite Inspection Checklist (annex D), was discussed with owners, contractors, and safety and health personnel at the bridge sites and was modified according to site-specific activities.

Reviewer feedback

Steel-structure owners (state agencies and private companies), contractors, safety and health consultants, occupational health researchers, and representatives of federal and state agencies in environment, transportation, and occupational health received the checklist by mail and during site visits to bridge and overpass construction sites in New Jersey. The comments quoted below summarize the reviews and critical feedback on content and format of the checklist.

* Under the Job Planning section:

- 1) Add to list contact local community board to inform them of project impact.

*Under the Pre-Qualification and Contractor Selection section:

- 1)Where applicable, this section of the contract should reference state or municipal requirements for specialized licenses for contractors conducting lead abatement, as well as all worker permit and training requirements.
- 2) Documentation from contractor should include specifics on previous successful completion of comparable work.
- 3) The criteria for past performance evaluation should also apply to sub-contractors.

*The number of acronyms made the form difficult to follow.

*Under Preliminaries, Section D, Submittal of Comprehensive Safety & Health Program (by Contractor): The written plan should also include a description of the contractor's hearing conservation and hazard communication programs.

1) Also, under Noise PEL 90 dBA there should be a noise monitoring survey and the results should be provided to the Owner.

2) When conducting exposure monitoring for lead and other known hazards contractors should provide results by number of samples per task collected.

3) Respiratory protection should include carbon-monoxide monitoring for compressor equipment.

4) The Comprehensive Lead Health & Safety Plan should also include other known safety and health hazards, including:

- Confined space
- General construction safety vests, hard hats, fire extinguishers, emergency communication plan
- Laboratory certifications (for both blood and air monitoring analysis)
- Emergency contacts and phone numbers
- Catalogue cuts for Equipment
- Material safety data sheets for all chemical containing products
- Specific location of written safety and health program during project
- Specific location of records during project
- Name(s) of OSHA competent person
- Wipe sampling
- Collection of waste (paint chips, water, grit, contaminated materials)
- Respiratory/blood lead level/ZPP clearance
- Ambient air monitoring (TSP or PM₁₀) conducted by third party

*Under Pre-Construction Phase: Language describing need for notification of appropriate regulatory agencies responsible for worker protection should also include environmental agencies.

*Under Construction Phase (Contractors): Recommended that language stating that IH implements written Lead Health & Safety Plan be changed to state the IH assures that LHASP is implemented.

*Under Medical Surveillance: Contractors: Recommend monthly monitoring

1) Also, medical surveillance should be in accordance with 29 CFR 1926.62(j)

*Under Industrial Hygiene Activities section: Recommended that IH be on site at least 1/week for a minimum of 2 hours.

1) Also, IH should develop and oversee implementation of respirator protection program in compliance with 29 CFR 1926.134.

- 2) IH should maintain a contractor log of personnel.
- 3) Evaluate cross draft/down draft velocity (SSPC) guidelines.
- 4) Conduct 4 hour weather reports to warn of inclement weather and high winds.
- 5) Maintain records for training, permits, respiratory clearance, construction safety.

*Under Qualifications of Construction Safety and Health Specialist: Terminology “adequate duty time” too vague.

- 1) Also, suggested that CSHS receive a minimum of 32 hours lead abatement training for steel structures (e.g. SSPC-3/Supervisor/Competent Person Course/ State certification where necessary).
- 2) Review of respiratory clearance prior to project commencement.
- 3) CSHS should also be responsible for monitoring visible emissions.

*Under Wipe Sampling section: Add to list of items to assess: contamination of surfaces, vehicles, respirators, equipment.

*Under Hygiene Facilities and Practices section: Hand washing facilities should have hot and cold water, soap, clean towels.

- 1) Also, person handling contaminated clothing (laundry if done on-site) should be informed in writing of potential hazards.
- 2) Containers of contaminated clothing should be labeled as required under 29 CFR 1926 (g) (2) (vii).

* There should be a separate section on signs in accordance with 29 CFR 1926.62 (m).

*There should be a separate section on record keeping and length of time needed to maintain such records including:

- Personal airborne exposure monitoring
- Medical surveillance
- Wipe sampling
- Ambient air monitoring

*Under Training section:

- 1) Change language of first item to include all workers and supervisors, including foremen
- 2) Rather than stating that training must comply with EPA standards, state more

specifically that employees should be trained in handling hazardous waste in accordance with 40 CFR 265.16

3) List of items should include site-specific training.

4) Site-specific training should be a minimum of 4 hours.

5) Weekly tool box meetings should be mandatory and cover issues and problems related to implementation of the LHASP. Paychecks should be distributed at this forum.

6) WORKSITE training by “competent” person ongoing through entire job. Verbal warnings, write-ups, followed by withholding pay or removal of non-compliant worker until behavior changes.

* Under the Quality Assurance section: Efforts by the joint safety and health committees (JSHC) should include periodic unannounced visits as part of the quality assurance program.

1) Also, the JSHC should include a Certified Industrial Hygienist and the committee should be able to review relevant reports prior to meeting.

2) Representation by each craft and subcontractor on the JSHC should occur for projects < 2 to 3 months duration rather than 1 month.

3) Recommended that JSHC meetings occur bi-weekly rather than monthly.

Field observations

Although the authors did not conduct walkthroughs using the checklist, they did solicit input and feedback about its use from those actively engaged in daily operations on each site. There appeared to be unanimous support for use of the checklist by owners and contractors.

Construction contractors involved in the contract-bidding process expressed the idea that standardizing the process for the content of health and safety programs would help equalize the playing field for those involved in the contract-bidding process.

Because low bids often win contracts with state and federal agencies, health and safety programs — with their potential for increased costs up front — often receive minimal resources and attention from contractors seeking to be competitive. Anecdotal information from contractors indicates this variability is seen in the pricing contract bids for work in New Jersey.

The personnel visited by the authors at the four New Jersey bridge sites were all engaged in the construction phase of their projects, so observations are limited to self-reported actions on the part of the owners, contractors, and competent persons, and what the authors saw at the time of the visit.

On two of the sites visited, contractor records and decontamination trailers were off site because of limited space on highway overpasses. On such sites, from which workers are driven to shower facilities, the authors were unable to note the condition of the workers’ hygiene facilities and

practices. At the two sites where hygiene facilities were adjacent to the bridge work, the authors observed conditions that did not instill confidence in the implementation of model specs guidelines. Lunch areas were close to containment tarps covered with lead dust and the clean and contaminated areas for removal of contaminated work clothing were inappropriately sealed, allowing cross-contamination between the areas.

At each of the sites, the workers appeared to have appropriate protective gear. However, competent-person oversight of appropriate use of worker-hygiene practices and use of protective gear and protective equipment varied widely. In one instance, the competent person described in detail the washing and disrobing practices he required of workers leaving containment areas where abrasive blasting occurred. He also explained actions taken — types of warnings — if appropriate protocols were not followed. However, the authors observed competent persons who did not enforce appropriate hygiene practices before eating or drinking at two of four sites.

At one site, the authors observed unlabeled hazardous lead waste from abrasive blasting in mesh bags in front of vacuum equipment, and a lack of appropriate containment for contaminated water used for hand washing. The authors were informed about awkward postures causing breaks in the seals of respirator face pieces during paint removal and while repainting. The authors were also informed about difficulties managing containment of waste material after abrasive blasting and during relocation of containment structures and equipment from one part of a job to another.

The purpose for the field visits was to gather information about the viability and usefulness of the checklist. However, the authors did note data posted at one site indicating that 30% of the workers had blood lead levels above 30 $\mu\text{g}/\text{dL}$ — below the level at which OSHA requires medical removal from a job, yet above the benchmark of 25 $\mu\text{g}/\text{dL}$ set by the U.S. Public Health Service for the year 2000. The authors did not observe blood lead-level data posted at the other sites, as required by the OSHA construction standard. (The authors spoke with supervisors about posting the blood lead-level data.)

Conclusions and Recommendations

OSHA's Interim Standard for Lead in Construction holds the promise of providing safe and healthful work environments for construction workers nationwide. In New Jersey, there are more than 3,000 bridges and overpasses, 400 of which are slated for contract work involving thousands of workers in the next decade. Support for the use of a checklist to facilitate monitoring implementation of the CPWR *Model Contract Specifications for the Protection of Workers from Lead on Steel Structures* was uniformly positive from owners, contractors, safety and health specialists, and regulators. Surveillance data from most state lead registries indicate elevated blood lead levels continue among construction workers, except in Connecticut. Despite the reported decreases in overexposures, studies conducted by federal researchers suggest that many construction workers in the United States have lead levels higher than the general population and are placing their family members at risk for potential exposures via the take-home route of exposure (Rabin, Brooks, and Davis 1994; Roscoe, Gittleman, Deadens, and Halperin 1996). Thus far, only four states — Connecticut, Maryland, Massachusetts, and New Jersey — have taken steps to implement innovative interventions such as the use of lead health and safety specifications in contract language to attempt to address this problem.

This checklist has been developed as part of CPWR's continuous improvement process for use of the model contract specifications for the protection of workers from lead on steel structures. Representatives from agencies including the U.S. Environmental Protection Agency, National Institute for Occupational Safety and Health, National Institute of Environmental Health Sciences, and transportation and /or health agencies in California, Connecticut, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, and Texas have been involved in the specifications' development in 1993 and updating, begun in 1996 and still under way.

This project sought insight, as well, from owners and workers actively engaged in painting and in lead-based paint abatement on steel structures in New Jersey. As a result of this process, the authors have identified points in the model specifications requiring further clarification. The next step will be to pilot the checklist on future construction projects and assess its usefulness in guiding owners, contractors, safety and health specialists, and those with regulatory oversight toward improvements in comprehensive lead health and safety language and implementation for construction workers. Finally, the authors believe implementation of the CPWR model specifications can be enhanced by coordination and sharing of information among state and federal departments of transportation, agencies involved in lead surveillance, and owners and employees engaged in the protection of construction workers' health and safety.

References

- Centers for Disease Control and Prevention, Department of Health and Human Services. 1992. Lead poisoning in bridge demolition workers--Massachusetts, 1992. *Morbidity and Mortality Weekly Report*, 38:687,693-94.
- . 1993. Lead poisoning in bridge demolition workers—Georgia, 1992. *Morbidity and Mortality Weekly Report*, 42:388-90.
- Erville, Pierre. 1996. *Implementing Lead-Safe Work Practices for Steel Structures: Transportation Agency Policies in Twelve States*. Washington, D.C.: The Center to Protect Workers' Rights. (report OSH1-96).
- Gerwel, Barbara, David Valiante, J Pescatore, and Martha Stanbury. 1993. Lead exposure in bridge construction workers. *American Journal of Public Health*, 83:1054-55.
- Gittleman, Janie, Michael Engelgau, Joseph Shaw, Kathleen Willie, and Paul Seligman. 1994. Lead Poisoning Among Battery Reclamation Workers in Alabama. *Journal of Occupational Medicine*, 36(5):526-32.
- Goldberg, Mark, Cora Roelofs, Jean Weiner, and Deborah Nagin. 1996 *Occupational Blood Lead Surveillance of Construction Workers: Health Programs in Twelve States*. Washington, D.C.: The Center to Protect Workers' Rights, 1-37. (report OSH2-96).
- . 1997. *Occupational Blood Lead Surveillance of Construction Workers, II: Health Programs in Thirteen States*. Washington, D.C.: The Center to Protect Workers' Rights. (report OSH1-97).
- Israel, Barbara, Susan Shurman, and Margrit Hugentobler. 1992. Conducting Action Research: Relationships Between Organization Members and Researchers. *Journal of Applied Behavioral Science*, 28(1):74-101.
- Maurer, Katherine . 1995. Controlling lead toxicity in bridge workers--Connecticut, 1991-1994, *Morbidity and Mortality Weekly Report*, 44(4)76-79.
- Model Specifications for the Protection of Workers from Lead on Steel Structures*. 1993. Washington, D.C.: The Center to Protect Workers' Rights, Report OSH3-93
- Rabin, Richard, David Brooks, and Letitia Davis. 1994. Elevated blood lead levels among construction workers in the Massachusetts occupational lead registry. *American Journal of Public Health*, 84:1483-85.
- Roscoe, Robert, Janie Gittleman, James Deadens, and William Halperin. 1996. A Meta-Analysis of Blood Lead Levels among Children of Lead Exposed Workers. (submitted for publication to the New England Journal of Medicine).

Ventura, Joe, and Pam Susi. 1996. Implementing and Evaluating Model Lead Specifications. *Industrial Lead Paint Abatement: Preparing for the Future. Proceedings from SSPC's Ninth Annual Industrial Lead Paint Abatement and Removal Conference*, March 11-13. Pittsburgh, Pa.

Walker, Karen, Ana Maria Osorio Neil Maizlish, and Susan Royce. 1992. Lead exposure in the construction industry: Results from the California occupational lead registry, *American Journal of Public Health*, 82:1669-71.

Whelan, Elizabeth, Greg Piacitelli, Barbara Gerwel, Teresa Schnorr, Charles Mueller, Janie Gittleman, and Thomas Matte. 1997. Elevated Blood Lead Levels in Children of Construction Workers. *American Journal of Public Health, Notes in Brief*, 87(8): 1352-55 (August).

Abbreviations

ACGIH	American Conference of Government Industrial Hygienists
ABLES	Adult Blood Lead Epidemiology and Surveillance program
ART	Action research team
BLL	Blood lead level
CFR	Code of Federal Regulations
CSHS	Construction safety and health specialist
CPWR	The Center to Protect Workers' Rights
dB	Decibels (noise measurements)
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
HEPA	High-efficiency particulate air (filter)
IH	Industrial hygienist
JSHC	Joint safety and health committee
LHASP	Lead health and safety plan
MSHA	U.S. Mine Safety and Health Administration
NASA	National Aeronautic and Space Administration
NIOSH	National Institute for Occupational Safety and Health
NJDOT	New Jersey Department of Transportation
OSHA	Occupational Safety and Health Administration
PEL	Permissible exposure limit
PM₁₀	Particulate matter less than or equal to 10 micrometers in diameter
SSPC	The Society for Protective Coatings (formerly Steel Structures Painting Council)
TSP	Total suspended particulates
TWA	Time-weighted average
µg/dL	Micrograms per deciliter
µg/m³	Micrograms per cubic meter
ZPP	Zinc protoporphyrin