

## **Background to OLPPP's Proposed Changes to the Lead in Construction Standard**

### **Introduction**

The Cal/OSHA construction lead standard is based on lead toxicity information that is now over 30 years old. Although the standard was written in 1993, the scientific and medical underpinnings of the standard relied on the 1978 General Industry Lead Standard. Current medical information clearly demonstrates harmful effects of chronic and low-level exposures to lead in adults; these effects occur at sustained blood lead levels well below those currently allowed by the standard. The California Department of Public Health's Occupational Lead Poisoning Prevention Program (OLPPP), has reviewed the recent scientific information and has made health-based recommendations on the care of lead-exposed employees<sup>1</sup>. These recommendations should be incorporated into revised lead standards.

In June 2010, OLPPP transmitted to Cal/OSHA health-based recommendations for revisions to the General Industry (GI) Lead Standard. OLPPP has now developed similar recommendations for the Lead in Construction (LIC) Standard that take into account the special nature of construction work. This document summarizes OLPPP's recommendations for revisions to the LIC standard. Readers are also encouraged to see the document "Background to OLPPP's Proposed Changes to the General Industry Lead Standard"<sup>2</sup>.

### **Sections of Standard Needing Updating**

Based on current medical/toxicological knowledge of lead, OLPPP is recommending revisions of the Medical Surveillance, Medical Removal Protection (MRP), Permissible Exposure Limit (PEL) and Action Level (AL) sections of the Lead in Construction (LIC) standard. OLPPP is also recommending changes to Protective Clothing, Hygiene, Training, Warning Sign, and Engineering and Work Practice requirements to strengthen these aspects of the standard consistent with current medical/toxicological knowledge.

### **Summary of Key Recommendations**

#### **Medical Surveillance**

- Medical surveillance, including blood lead level (BLL) testing, should be provided to all employees likely to be exposed to lead and should not be solely dependent on personal airborne lead level measurements.
- After the initial series of BLLs, time intervals between sampling should reflect the importance of maintaining BLLs below 10 µg/dL with testing intervals decreasing once BLLs are above 10 µg/dL.
- Examination of teeth and gums is obsolete and should be deleted.
- All employees to be assigned to areas where level 2 or 3 trigger tasks are performed should receive a baseline medical exam.
- All employees with the potential for lead exposure should be provided an annual blood pressure measurement and a brief questionnaire regarding medical conditions that might increase the risk of adverse health effects of lead exposure.
- Routine ZPP testing should be deleted.

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<sup>1</sup> OLPPP Medical Guidelines for the Lead-Exposed Worker, April 2009.

<sup>2</sup> <https://www.cdph.ca.gov/Programs/CCDC/DEODC/OHB/OLPPP/CDPH%20Document%20Library/LICStdRecsSummary.pdf>

### **Medical Removal Protection (MRP)**

- Workers should be removed from lead exposure if a single blood lead concentration is at or above 30 µg/dL or if two successive blood lead concentrations measured over a four-week interval are at or above 20 µg/dL. Employees who have been medically removed may return to work when two blood lead tests taken four weeks apart are less than 15 µg/dL.

### **Permissible Exposure Limit (PEL) / Action Level (AL)**

- The PEL and AL should be reduced in order to achieve lower BLLs which reflect new medical/toxicological information on chronic and low-level health effects.

### **Additional Recommendations**

#### **Protective Work Clothing**

- Employers should be required to provide protective work clothing and shoes to all employees performing level 1, 2, or 3 trigger tasks or exposed to lead at or above the AL.

#### **Hygiene**

- More health protective hygiene practices and policies should be in place to eliminate ingestion of lead.
- Employers should be required to regularly test surfaces in eating areas and change areas and to clean more frequently when lead is found. A quantitative limit for lead on surfaces should be set and acceptable sample collection and analysis methods should be specified.

#### **Training**

- Employee training should be conducted quarterly.
- Training should be provided in a format that is accessible to employees. Specifically, training should be in a language understandable to workers and the methods used should be appropriate for employees with no or low literacy skills. Training should maximize the use of participatory and hands-on methods.

#### **Warning Signs**

- Employers should be required to post a warning sign in areas where lead is present. The sign should be in a language understandable to workers.

#### **Engineering and Work Practice Controls**

- Minimum engineering and work practice controls should be defined and required unless the employer can demonstrate that such controls are not feasible.
- Certain high risk work practices should not be allowed.

## **Medical Surveillance**

### **Trigger for Medical Surveillance<sup>3</sup>**

Recommendation: Medical surveillance, including blood lead level testing, should be provided to all employees likely to be exposed to lead and should not be solely dependent on personal airborne lead level measurements.

The current standard requires that employees be enrolled in a medical surveillance program only if personal airborne lead level measurements exceed  $30 \mu\text{g}/\text{m}^3$  on 30 or more days in any consecutive 12 month period. As few employers ever conduct the air monitoring required for making this determination, many lead-exposed workers never receive the benefit of medical surveillance. In addition, using personal airborne lead level measurements as the trigger for medical surveillance misses possible dangerous ingestion exposure that may occur even when airborne lead levels are low.

OLPPP is recommending blood lead level testing based on trigger tasks in addition to air monitoring. This simplifies compliance with blood lead level testing for employers. In addition, OLPPP is recommending an exemption from medical surveillance, including blood lead level testing, for employees doing level 1 trigger tasks for fewer than 8 hours in a month when certain work practice controls are in place.

### **Frequency of BLL Testing**

Recommendation: After the initial BLL, time intervals between sampling should reflect the importance of maintaining BLLs below  $10 \mu\text{g}/\text{dL}$ , with testing intervals decreasing once BLLs are above  $10 \mu\text{g}/\text{dL}$ .

Specifically, all employees subject to medical surveillance should have a BLL at least every month for the first three months or upon change in task to a higher exposure, then every six months thereafter. Employees with a BLL at or above  $10 \mu\text{g}/\text{dL}$  should be tested at least every three months, and those with a BLL at or above  $20 \mu\text{g}/\text{dL}$  should be tested at least every four weeks. Once three consecutive BLLs, taken at least four weeks apart, indicate a BLL below  $10 \mu\text{g}/\text{dL}$ , the testing reverts to at least every six months. Employees on medical removal protection due to an elevated blood lead level should be tested every four weeks during the removal period.

### **Medical Examinations**

Recommendation: Examination of teeth and gums is obsolete and should be deleted.

Improvements in oral hygiene and decreases in average blood lead levels make examination of the teeth and gums obsolete and OLPPP recommends deleting this component of the exam. The content of the baseline or pre-placement history and physical exam for lead-exposed employees should continue to follow the comprehensive scope already in the lead standard.

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<sup>3</sup> Primary Reference for this section: Kosnett M, Wedeen R, Rothenberg S, Hipkins K, Materna B, Schwartz BS, Hu H, Woolf A. (2007). Recommendations for Medical Management of Adult Lead Exposure. Environmental Health Perspect, 115(3):463-471. Available from: <http://www.ehponline.org/members/2006/9784/9784.pdf>

Recommendation: Provide a baseline medical exam to each employee being assigned for the first time to an area where employees perform level 2 and 3 trigger tasks, unless the employer has provided an exam in the previous 12 months.

A baseline medical exam will ensure that medical conditions (such as renal insufficiency) and other factors that might increase the risk of adverse health effects of lead exposure are brought to the attention of a physician *before* potentially harmful exposure occurs.

Recommendation: Provide to all employees with the potential for lead exposure an annual blood pressure measurement and a brief questionnaire regarding the presence of medical conditions (such as renal insufficiency) and other factors that might increase the risk of adverse health effects of lead exposure.

This will supply physicians overseeing employee care with an annual update on medical information which could be important to consider in medical management decisions of lead-exposed workers. OLPPP can assist with the development of an annual questionnaire.

### **Labs**

Recommendation: Routine ZPP testing should be deleted.

OLPPP recommends deleting routine measurement of zinc protoporphyrin as it is an insensitive biomarker of lead exposures in individuals with blood lead concentrations less than 25 µg/dL. Medical surveillance physicians can order any test necessary, including ZPP, when evaluating workers with elevated BLLs.

### **MRP Level**<sup>4</sup>

Recommendation: Workers should be removed from lead exposure if a single blood lead concentration is at or above 30 µg/dL or if two successive blood lead concentrations measured over a four-week interval are at or above 20 µg/dL. Employees who have been medically removed may return to work when two blood lead tests taken four weeks apart are less than 15 µg/dL.

Looking at the preamble to the Federal OSHA's general industry lead standard, MRP is viewed as a protective, preventive health mechanism providing temporary medical removal for workers at risk of sustaining material impairment to health from continued exposure to lead. OLPPP's blood lead level removal criteria derive from the conclusion that long-term blood lead levels in excess of 10 µg/dL must be avoided to prevent long-term health risks associated with lead exposure (including hypertension, effects on renal function, cognitive dysfunction, and adverse female reproductive outcomes).

OLPPP is also evaluating the need for recommendations for extending the maximum period of time of medical removal protection benefits for workers with chronic exposure to lead, based on modeling of the decline of elevated BLL in workers with significant bone stores. As discussed in more detail below, OLPPP is working with the California Environmental Protection Agency's

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<sup>4</sup> Primary Reference for this section: Kosnett M, Wedeen R, Rothenberg S, Hipkins K, Materna B, Schwartz BS, Hu H, Woolf A. (2007). Recommendations for Medical Management of Adult Lead Exposure. Environmental Health Perspect, 115(3):463-471. Available from: <http://www.ehponline.org/members/2006/9784/9784.pdf>

(Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA) on pharmacokinetic modeling for lead.

### **PEL/AL**

**Recommendation:** The PEL and AL should be reduced in order to achieve lower BLLs which reflect new medical/toxicological information on chronic and low-level health effects.

The existing lead PEL of 50  $\mu\text{g}/\text{m}^3$  was selected with a goal of achieving a mean and maximum BLL of 40  $\mu\text{g}/100\text{g}$  and 60  $\mu\text{g}/100\text{g}$ , respectively<sup>5</sup>, and was derived from computer modeling of correlations between air lead levels and corresponding BLLs. The PEL was based on consideration of the health effects associated with exposure to lead, feasibility issues<sup>6</sup>, and correlation of airborne concentrations of lead with BLLs associated with adverse health effects and symptoms of exposure. Physicians and scientists now recognize that health effects can occur with long-term BLLs in excess of 10  $\mu\text{g}/\text{dL}$ ; a BLL goal of 40  $\mu\text{g}/\text{dL}$  is no longer acceptable. In addition, lower air lead levels not achievable in 1978 are now feasible.

The existing lead AL of 30  $\mu\text{g}/\text{m}^3$  was set at a 'point commensurate with the beginning of potential risks to reproductive capacity.' According to the Attachments to the Preamble for the Final Lead Standard, the 'blood lead level of both men and women who wish to plan pregnancies should be maintained at less than 30  $\mu\text{g}/100\text{g}$  during this period, and this evidence forms the basis for the action level of 30  $\mu\text{g}/\text{m}^3$ , and for other provisions of the standard.'<sup>7</sup> It is now recognized that adverse female reproductive outcomes associated with lead exposure in adults are associated with BLLs of 5  $\mu\text{g}/\text{dL}$  or higher.

OLPPP has not yet developed specific recommendations for a health-based PEL and AL. We are working in collaboration with Cal/EPA's OEHHA to select the best available physiologically-based pharmacokinetic model to generate a revised PEL and AL, one which takes into account current medical information about the health effects of lead at lower BLLs and potential routes of workplace exposure. When this work is completed OLPPP will make a specific recommendation on the appropriate health-based PEL and AL and will provide documentation for the levels.

### **Protective Work Clothing**

**Recommendation:** Employers should be required to provide protective work clothing and shoes to all employees performing level 1, 2, or 3 trigger tasks or exposed to lead at or above the AL.

The current standard does not require that employers provide protective work clothing and shoes until exposures are above the PEL. OLPPP believes that this is insufficiently protective. Lead brought home from the workplace on workers' clothes and shoes has resulted in numerous cases of lead poisoning in children and other family members.<sup>8</sup>

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<sup>5</sup> Federal Register, 1978, U.S. Department of Labor, Occupational Safety and Health Administration, Occupational Exposure to Lead, Attachments to the Preamble for the Final Standard, Vol. 43-No. 225, November 21. p. 54400.

<sup>6</sup> Ibid. p. 54412.

<sup>7</sup> Ibid. p. 54412.

<sup>8</sup> National Institute of Occupational Safety and Health. (1995). Report to Congress on Workers' Home Contamination Study Conducted Under the Workers' Family Protection Act (29 USC 671a), DHHS (NIOSH) Publication No. 95-123. Available from: <http://www.cdc.gov/niosh/pdfs/95-123-a.pdf>; Hipkins KL, Materna BL, Payne SF, Kirsch LC (2004). Family Lead Poisoning Associated with Occupational Exposure. Clinical Pediatrics, November/December 2004: 845-849; E A Whelan, G M Piacitelli, B Gerwel, T M Schnorr, C A Mueller, J Gittleman, and T D Matte. (1997). Elevated blood lead levels in children of construction workers. Am J Public Health 87: 1352-1355.

## **Hygiene**

**Recommendation:** Eating, drinking, smoking, or applying cosmetics should be prohibited in areas where employees alter or disturb lead containing materials or lead containing paint or coatings.

**Recommendation:** Workers should be required to wash up before eating, drinking, smoking or applying cosmetics whenever they alter or disturb lead containing materials or a lead containing paint or coating.

**Recommendation:** Employers should be required to provide clean eating and change areas for employees who work in areas where lead containing materials or lead containing paint or coatings are altered or disturbed. Employers should be required to conduct qualitative or quantitative testing for lead on surfaces to ensure cleanliness.

Studies have shown an association between lead contamination on workers' hands and their blood lead levels.<sup>9</sup> To eliminate the potential for ingestion of lead, more health protective hygiene practices and policies are needed. Elimination of the potential for exposure via ingestion will help achieve lower BLLs which reflect new medical/toxicological information on chronic and low-level health effects.

**Recommendation:** Employers should be required to regularly test surfaces in eating areas and change areas and to clean more frequently when lead is found. When using a qualitative colorimetric test method, surfaces should be free of detectable levels of lead. When using a quantitative test method involving laboratory analysis, surface contamination should never exceed a quantitative limit. A quantitative limit for lead on surfaces should be set and acceptable sample collection and analysis methods should be specified.

To minimize ingestion as an exposure route, the lead in construction standard requires that employers provide clean eating facilities and clean change areas. However, the standard does not define clean in quantitative terms, making it difficult for Cal/OSHA to enforce these provisions. In fact, several Cal/OSHA inspectors have asked OLPPP for guidance on quantitative surface contamination limits they could reference in their citations.

OLPPP has not yet developed a specific recommendation for a quantitative limit for surface contamination. As described earlier in this document, we are working in collaboration with California Environmental Protection Agency's OEHHA to select the best available pharmacokinetic model for lead. When this work is completed OLPPP will make a specific recommendation for a quantitative limit and will provide documentation for the level.

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<sup>9</sup>Askin, D.P., Volkmann, M. (1997). Effect of personal hygiene on blood lead levels of workers at a lead processing facility. *Am Ind Hyg Assoc J*, Oct (58)10:752-753.

## **Employee Information and Training**<sup>10</sup>

**Recommendation:** In addition to the current training requirements of the standard, quarterly toolbox/tailgate lead safety meetings should be required.

The current requirement that training only be repeated annually is insufficient. More frequent training will remind workers of the need to consistently follow lead-safe practices and ensure that employers address new hazards or changes to work processes in a timely manner. Employers may choose to incorporate quarterly toolbox/tailgate lead safety meetings into their existing tailgate training program.

**Recommendation:** Training should be provided in a format that is accessible to employees. Specifically, training should be in a language understandable to workers and the methods used should be appropriate for employees with no or low literacy skills. Training should maximize the use of participatory and hands-on methods.

In OLPPP's experience employer lead safety training is often provided only in English and is heavily dependent on written materials with little use of participatory and hands-on methods. The result is that many workers are poorly trained in lead safety.

## **Warning Signs**

**Recommendation:** Employers should be required to post a warning sign in areas where lead containing materials or lead containing paint or coatings are altered or disturbed.

The current standard requires that a warning sign be posted in work areas that exceed the PEL. The sign warns workers that lead is a poison and that no smoking or eating is allowed in the area. As OLPPP is recommending that eating, drinking, smoking, and applying cosmetics be prohibited in areas where lead is altered or disturbed, a warning sign should also be required in any area where lead is altered or disturbed.

## **Engineering and Work Practice Controls**

**Recommendation:** Employers should be required to use specific, minimum engineering and work practice controls unless the employer can demonstrate that such controls are not feasible. Certain high risk practices should not be allowed.

The new work practice controls OLPPP is recommending (including wet methods for minimizing lead-containing dust, local exhaust ventilation on power tools, and isolation of the work area, etc.) are consistent with EPA's Renovation Repair and Painting Rule<sup>11</sup> and are standard industry practice. They are also consistent with the training provided by CDPH certified training providers for doing lead safe work and with the recommendations of a published study entitled

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<sup>10</sup> Primary References for this section: National Research Council, (2003). Safety is Seguridad. Washington, DC. National Academy of Sciences; Brunette, M.J. (2005). Development of Educational and Training Materials on Safety and Health: Targeting Hispanic Workers in the Construction Industry. Fam Community Health, 28, No. 3, 253-266; Gillen, M., Baltz, D., Gassel, M., Kirsch, L., Vaccaro, D., (2002). Perceived safety climate, job demands, and coworker support among union and nonunion injured construction workers. J Safety Res, 33, 33-51; Harrington, D., Materna, B., Vannoy, J, Scholz, P. (2009). Conducting Effective Tailgate Trainings, Health Promot Pract, Volume 10 Issue 3, 359-369.

<sup>11</sup> 40 CFR Part 745 Lead; Renovation, Repair, and Painting Program  
Federal Register / Vol. 73, No. 78 / Tuesday, April 22, 2008 / Rules and Regulations

“Residential and Commercial Painters’ Exposure to Lead during Surface Preparation”, by OLPPP staff members.<sup>12</sup> The work practices that OLPPP proposes be prohibited are also prohibited under the EPA rule.

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<sup>12</sup> Peter F. Scholz, Barbara L. Materna, David Harrington, and Connie Uratsu, Residential and Commercial Painters’ Exposure to Lead during Surface Preparation, 2002.



**Comparison Table of Current LIC Standard Triggers/Requirements vs. Proposed Triggers/Requirements (4/07/11)**

REQUIREMENT	TRIGGER				
	<b>Scope</b>	<b>Lead altered/disturbed</b>	<b>Level 1,2, 3 Trigger Tasks</b>	<b>AL</b>	<b>PEL</b>
<b>Exposure monitoring</b>	--Not proposing any changes to this section				
<b>Protective clothing + laundry</b>			--Protective clothing and laundry service	--Protective clothing and laundry service	--Protective clothing and laundry service
<b>Housekeeping</b>	--All work surfaces maintained free of lead dust accumulation				
<b>Hygiene (next 7 reqs.)</b>					
<b>Prohibit eating, drinking, smoking, in work areas</b>		--Prohibit eating, drinking, smoking, etc in work areas			--Prohibit eating, drinking, smoking, etc in work areas
<b>Change areas</b>			--Provide clean change areas <del>as interim measure until exposure monitoring</del>	--Provide clean change areas	--Provide clean change rooms
<b>Showers</b>					--Provide showers
<b>Eating facilities/Clean eating area</b>		--Provide clean eating area			--Provide clean lunchroom facilities as defined in standard
<b>Wash-up requirement</b>		--Ensure employees wash-up before breaks			--Ensure employees wash-up before breaks
<b>Surface sampling</b>		--Test eating area and change area surfaces weekly with a colorimetric or quantitative method			
<b>Surface contamination limit</b>		--When using a quantitative method, must meet a specific surface limit			
<b>Medical surveillance</b>			--Enroll in medical surveillance program if doing Level 2,3 task; Level 1 tasks if >8 hrs in 30 days	--Enroll in medical surveillance if exposure ≥ AL 30 or more days/year (still in revised standard)	
<b>Medical removal protection</b>		--Transfer to area where no lead altered or disturbed if BLL at or above 30 µg/dL or average of 20 over 4 weeks		--Transfer to area at or below the AL if BLL at or above 50 µg/dL	
<b>Training</b>	--Inform workers of lead hazards per Hazard Communication Std.			--Comprehensive annual training; quarterly toolbox/tailgate training	
<b>Signs</b>		--Warning sign in work area where lead altered or disturbed			--Warning sign in work area above the PEL
<b>Exposure Control</b>					--Engineering, work practice, respirators; specific, min eng and work practice controls req unless shown infeasible; prohibited practices
<b>Compliance Plan</b>					--Written compliance plan