The OSHA Lead in Construction Standard: Thirteen Years After

CSTE Conference: ABLES Session
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Since the adoption of the OSHA Lead in Construction (LIC) Standard in 1993, Federal and state OSHAs', ABLES programs, NIOSH, contractors, unions and others have acquired a vast amount of data, information and experience about the protectiveness and feasibility of this regulation. Several years ago ABLES programs put forward some recommendations for changes to the Standard but found little receptivity. Recent initiatives by the National Association of Home Builders and others have resulted in OSHA undertaking a review process and requesting comments from stakeholders. While some would like to roll back major elements of the standard others recognize the need to further refine and tailor the standard to construction industry-specific conditions while still remaining protective of workers. This is occurring at the same time the scientific evidence shows that the Standard is not protective when it comes to medical monitoring and removal protection. Meanwhile, EPA has finally proposed a residential lead renovation and remodeling rule regarding lead-safe work practices.

This session involved a panel of ABLES and NIOSH personnel discussing the strengths and weaknesses of the standard and where improvements could be made with special focus on issues facing smaller contractors. Individual panelists focused on an area of the standard they have done work in e.g. exposure assessment, methods of compliance, respiratory protection, housekeeping and hygiene, medical monitoring and education and training. The audience was encouraged to participate and make their recommendations as well. A desired outcome from this session was that the ABLES/ NIOSH programs will have further clarified some areas for improvement and be able to put forward a set of recommendations that can be presented to a broader audience.

Learning Objectives: At the conclusion of this session, the participants were able to:

1. Recognize the strengths and weaknesses of the current LIC Standard.
2. Describe how the Standard could be improved in several areas.
3. Articulate recommendations that improve on the Standard's feasibility while still protecting workers and the public's health.

Underlining question to be addressed. Can the LIC Standard be made more feasible for small contractors while still protecting worker's health?

Summary of panelist's comments and audience input for grouped categories of the Standard follows:

Exposure assessment and methods of compliance:

Greg Piacitelli, CIH, NIOSH along with input from ABLES states' audience

Question: Is the 1993 OSHA Lead in Construction Standard adequately protecting workers from harmful lead exposures?

The OSHA LIC Standard, as written, can be effective. Levin et al demonstrated in 1997 that maximum BLLs in a cohort of NYC ironworkers fell significantly after the Standard was implemented. Likewise, the % of workers with BLLS <20 ug/dl was greater than before 1993.

Similarly, the Connecticut Road Industry Surveillance Project (CRISP) which requires contract specifications for lead health and safety provisions, demonstrated that enforced compliance with the Standard can effectively control worker exposures to lead and their resultant BLLs (99% of BLLs < 50ug/m3).

However, improper or inadequate implementation and enforcement of the Standard in the construction industry remains a problem.

Background: OSHA Standard for Lead in Construction requires that:

An employer must initially determine (either by sampling or from objective historical data) if any employees are exposed above the Action Level of 30 ug/m3.

If employees are exposed above the Action Level:
- they must be notified in writing of their results
- be provided medical surveillance if exposures >AL more than 1 day per year
- employers must repeat air monitoring at least every 6 months or whenever a significant work process change occurs—(What's wrong with that picture?? This is an obvious problem in construction where the work environment changes constantly)!!

For exposures greater than the PEL of 50ug/m3, the employer must:
- implement engineering and/or administrative controls to reduce exposures
- repeat air monitoring every 3 months
- provide respirators until exposures are <PEL
- provide change and shower facilities
- prohibit eating, drinking and smoking in work areas
- remove workers if their BLL >50ug/dl

In addition, workers performing certain "trigger" tasks such as:
- manual scraping/sanding (50-500 ug/m3)
- lead burning, power sanding (5000-2500 ug/m3)
- abrasive blasting, welding (>2500ug/m3)

are assumed to be exposed at levels above the PEL and therefore required to be provided appropriate PPE, change and shower facilities, and bio-monitoring.

What are the problems and deficiencies?

Some have suggested that air monitoring requirements are too burdensome and expensive, especially for small employers with limited resources. To minimize or eliminate air sampling, a lead prediction model or "lead index" have been suggested for selecting appropriate engineering controls and PPE.

In evaluating such a model, researchers from the California Lead Poisoning Prevention Program and UC Berkeley found that:
- air exposures are not correlated with paint lead content or task area size and therefore not useful a priori predictors
- short-term high exposures are often masked during full shift sampling
- while some tasks could be associated with different magnitudes of airborne exposure, there was a high degree of variability both between and within tasks so a task alone is not a good predictor of exposure

Research by NIOSH had similar findings. In addition, found that:
- certain exposure tasks such as dry manual sanding or scraping or power sanding can easily exceed the 8-hr TWA PEL in only a couple hours of performing the task continuously.
- workers performing ancillary activities (such as window caulking) in same areas as lead renovation tasks, had excessive exposures.

This suggests that assessing worker exposures to lead is complicated yet necessary. But, if followed as written, the provisions for exposure monitoring would require essentially continuous air sampling in the construction environment—since conditions are constantly changing. This quickly becomes expensive. In addition, sampling results are often received long after they would be pertinent and useful for a given work site.

So what improvements can be made so that useful and affordable information can be obtained for managing risks to lead at construction sites?

NIOSH has developed standardized field-portable sampling and analytical methods (both qualitative and quantitative) for use in detecting and measuring lead in the field—which are particularly useful for assessing lead exposures in construction. Because they are field-portable and in some cases, provide rapid results, these methods may help employers comply with the Standard and better protect lead-exposed workers.

These methods can be accessed on the NIOSH lead topic page that can be found at [http://www.cdc.gov/niosh/topics/lead/]:

NIOSH 7700, Lead in Air by Chemical Spot Test Kit (Qualitative)
NIOSH 7701, Lead in Air by Portable Voltammetry (Quantitative)
NIOSH 7702, Lead in Air by Portable X-Ray Fluorescence (Quantitative)

Additional comments:
In our experience, most contractors in the residential and smaller commercial marketplace do not measure airborne lead levels. If caught they are only cited for not doing the sampling but not for the lack of engineering controls and PPE. For these contractors it is almost a disincentive to do air sampling.

Even if the research does not support adopting a lead prediction model or "lead index" to reduce the burden of air sampling there are other fixes to this issue along with NIOSH's methods. For example the historical air sampling data requirement for trigger tasks could be adjusted where sampling does not have to be done within 12 months but less frequently in terms of every 3-4 years if the work is similar. If a contractor wants to opt out of certain engineering controls and PPE then they would have to conduct air sampling and document that employees are not exposed above the PEL.

For example, a painting contractor doing similar exterior surface preparation on similar aged housing, with similar lead content, over a 3-4 year period should be able provide the same level of protection and training to the crew based on previous air sampling results showing the range of possible airborne lead levels.

OSHA should still consider a "Task-Based Approach" for proven extremely low exposure trigger task activities. The air sampling requirement could then be eliminated. An exposure matrix could be developed that considers; range of percentage of lead content, task, time and controls. (For example the current HUD Guidelines define "low risk" versus "high risk" tasks and associated worker protection and work practice recommendations.)

For some tasks there are little airborne exposure risks while there is risk of ingestion, take home exposure and contamination to building occupants. The OSHA LIC addresses the first two areas but not the last one.

Respiratory protection, housekeeping and hygiene:
Greg Piacitelli, CIH, NIOSH along with input from ABLES states' audience

There were no specific comments regarding respiratory protection although it was pointed out that a trigger-task can be used to determine the required level of respiratory protection in the absence of air sampling data.

There is an additional concern about the current OSHA Standard (which NIOSH has addressed through several studies of "take-home" lead):

Currently, the requirements for hygiene provisions which are intended to prevent lead from leaving the workplace (such as employer-laundered work clothing and change/shower facilities) are triggered only for workers with airborne lead exposures exceeding the PEL.

However, NIOSH studies have shown that lead contamination is frequently carried from construction sites on employees and their clothing even when exposures are well below the PEL. In fact, NIOSH researchers found that workers with low air exposures (including industrial hygienists!) have the highest levels of lead contamination in their cars where the hygiene provisions were required only for workers with high exposures to airborne lead.

Study findings demonstrated that even when the proximity and time spent near lead sources did not result in excessive air exposures, worker activities may still result in lead deposition onto clothes and skin from contact with contaminated surfaces and/or dust settling. Therefore, airborne lead exposure alone is not sufficient for determining the potential for lead-contaminated clothing and skin and the need for hygiene provisions for employees at construction sites.

Based on these studies, employers should enhance using the PEL for airborne exposures as the sole trigger for the hygiene provisions of the lead standard.

Fortunately, some inexpensive surface sampling methods can provide additional options to efficiently target hygiene provisions to tasks and conditions of concern.

These methods include:

NIOSH 9100, Lead in Surface Wipe Samples (Quantitative)
NIOSH 9105, Lead in Wipes by a Colorimetric Spot Test (Qualitative)

Method 9100 is not particularly new and is similar to the quantitative method specified by HUD for clearance sampling which requires laboratory analysis.

However, Method 9105 was developed in 2001 and is a sensitive field-portable sampling method with immediate colorimetric detection of lead compounds on skin and other surfaces. This technology was subsequently patented and licensed in 2003 and is now commercially available under the brand name *Full Disclosure* (for more information on this method see below). The method is readily available, inexpensive, and an effective screening tool for detecting lead on dermal and hard surfaces.

NIOSH researchers have also found that construction workers do not always utilize protective clothing and shower/change facilities, even if provided. These findings suggest that more effective interventions, including education and enforcement, may be needed to prevent lead from leaving work sites. The availability of inexpensive surface sampling methods can also be used as part of education efforts to provide feedback to employees about the need to use hygiene provisions.

For many construction tasks in remodeling there is a much higher risk for lead ingestion, take-home exposure and site contamination than for breathing airborne lead. Employers should be compelled to provide job site adequate wash-up facilities and show evidence of education and training on hygiene issues along with having an enforced progressive

disciplinary policy. The NIOSH lead detection method under the brand name *Full Disclosure* should be utilized here as a hygiene assessment tool.

The same holds true for preventing take-home exposure. Clothes and shoes contamination occurs in varying degrees whether there is high airborne lead or just lead debris and dust from remodeling demolition. Employers should be compelled to provide disposables or laundered uniforms under most circumstances where lead is involved and not just when the PEL is exceeded (especially since they don't often know when the PEL is exceeded).

Home/building site lead contamination is more of an EPA jurisdictional issue and it is contractors who most often hold responsibility for creating the contamination and for doing the clean-up (especially under most circumstances when (abatement level) clearance testing by a certified inspector/assessor with laboratory analysis is not required).

OSHA and EPA should synchronize regulations whereby contractors would be employing NIOSH's new lead detection method for hygiene assessment and to determine when they have cleaned up the home/building space adequately. OSHA and/or EPA should compel contractors to meet lead contamination clean-up standards whereby the use of a colorimetric wipe-sampling method that would indicate the presence (or absence) of lead. The instant wipe method is SKC's "Full Disclosure Lead Wipe". The Full Disclosure method was developed and patented by the CDC/NIOSH. Following clean-up, the person wipes surfaces using a wipe and when lead is present, the wipe changes to a pink/red color indicating the need for additional cleaning. Information regarding SKC's Full Disclosure wipes can be found at http://www.skcinc.com/prod/550-001.asp

Medical monitoring and Medical Removal Protection:

Dr. Ken Rosenman, Michigan ABLES, along with input from ABLES states' audience

Medical Removal Protection (MRP) levels: the Standard is based on very out-of-date knowledge and literature. MRP should be lowered to 30 ug/dl and possibly somewhere <25 ug/dl. The medical/toxicology/epidemiological literature supports this recommendation.

The Association of Occupational and Environmental Clinics Medical Management Guidelines for Lead-Exposed Adults should be referenced in the revised standard and also be part of the appendices section. For more information go to: www.aoec.org. They are a useful guide for primary care providers and occupational health clinicians.

Requiring the inclusion of the Zinc Protoporphrin (ZPP) test as part of the blood lead level (BLL) test is generally not useful. It has some usefulness when workers report high blood lead levels and can under those circumstances could be employed as part of case management. The ZPP analysis doubles the cost of a blood lead test and can be a financial disincentive for employers to test their employees. A revised standard should drop the ZPP requirement except in circumstances where a high BLL is reported.

There has been no real improvement in the percentage of employers doing blood lead testing from 15 years ago. This has to be examined and further understood.

Linking air sampling with a medical surveillance schedule has not worked well due to the lack of air sampling and the dynamic nature of construction. The two should de-linked and function in a separate manner. The air sampling frequency requirements should be reduced while the blood lead testing frequency should be increased. At the minimum a construction project exit BLL test should be required. The worker resistance to frequent needle sticks and the employer resistance to having workers being off the job and costs can be addressed by utilizing finger stick testing instead of venous testing. While the skin lead contamination issues are more difficult with workers they can be addressed through some of the new sampling methods that have/are being developed.

Education and training:

David Harrington, MPH, California ABLES, along with input from ABLES states' audience

The Occupational Safety and Health Administration (OSHA), US Environmental Protection Agency (EPA), and Department of Housing and Urban Development (HUD) programs have created differing training requirements for construction contractors and workers that are inconsistent. Specifically, sources of confusion and contradiction include the classifications of employers and workers covered by the training requirements, the triggers for requiring training, and required procedures to protect non-workers (e.g., building occupants).

OSHA Training

The OSHA LIC Standard requires that all workers that are involved with lead be trained at a basic level.

For the first time it required that employers meet the Hazard Communication Standard for any worker, working around lead. (this was an improvement over the GI Lead Standard)

For workers:
exposed to lead at or above the Action Level (30 ug/m3) on any day or exposed to lead compounds that cause eye or skin irritation:

A full training program is required and it has to be done annually and prior to the time of the lead job assignment. However OSHA does not specify the length of the training nor how they training shall be delivered, e.g. hands-on, demonstration, etc.

The training must include 9 areas:

1. content of the LIC and the appendices;
2. operations that may cause lead exposure;
3. respirator program;

4. Medical surveillance and MRP program
5. health effects;
6. engineering controls and work practices;
7. contents of lead compliance plan;
8. prohibition of routine use of chelation agents;
9. employee's right of access to records

This list might seem comprehensive and therefore of high quality. The reality is that it can be an overwhelming list where many important topic areas only get slight attention. Federal OSHA has never produced a model training curriculum that would better inform contractors on what to train on and how to conduct the training.

What Triggers Training?
OSHA's training requirements are triggered by airborne lead levels on the jobsite. An exposure assessment is required when performing any of the trigger tasks.

The training requirements are the same whether you are exposed at or above the Action Level or at or above the Permissible Exposure Limit. There is no attempt to differentiate between low and higher exposure tasks even though construction is very much a task based set of work activities.

In our experience, most contractors in the residential and smaller commercial marketplace do not measure airborne lead levels.

If they do air sampling while performing a trigger task, the Standard states that the results can only be relied upon for 12 months as long as conditions are the same. These results determine many protection decisions including fulfilling these training requirements.

For some tasks there is little airborne exposure risk while there is risk of ingestion, take home exposure and contamination to building occupants. The OSHA training requirements include the first two areas but not the last one.

OSHA Should Consider a "Task-Based Approach" for proven extremely low exposure trigger task activities. The air sampling requirement could then be eliminated. An exposure/trigger task/training level matrix could be developed that considers; range of percentage of lead content, task, duration and controls. Without making it too complicated this matrix could further inform what level of training would be required. (For example the current HUD Guidelines define "low risk" versus "high risk" tasks and associated worker protection and work practice recommendations.) The training needs of a worker who primarily does remodels (primarily low airborne lead work) or a worker primarily doing repainting (primarily high airborne lead work) should be better reflected in the Standard.

Training Time and Quality
The OSHA LIC does not assess training quality and content. OSHA can learn from EPA's requirements for controlling the quality and effectiveness of worker training

programs. Congress directed EPA to promulgate regulations specifying minimum requirements for accreditation of training providers; minimum curriculum requirements for both classroom and hands-on training; minimum trainee competency and proficiency requirements; and minimum requirements for training program quality control.

It should be noted that, thus far, EPA has accomplished only a limited part of its training rule mandate, having promulgated rules for individuals performing lead-based paint activities in target housing and child-occupied facilities, where abatement and interim controls are employed. This a very small part of the market. The training requirements recently finally proposed for the vast majority of work (remodeling and repainting) are non-existent for worker protection and rely upon a model that calls for a one-day trained certified renovator to train and supervise these workers. (An untrained trainer training the untrained.) There is barely a mention of OSHA worker protection issues in that proposed curriculum content rule.

In evaluating EPA's existing training and accreditation requirements, OSHA should keep in mind that EPA premised its decision to require a 16-hour worker training program - rather than 32 hours, as the agency originally proposed -- on its understanding that employees would receive *additional* training under OSHA requirements. In moving from its proposed **32-** hour curriculum to 16 hours, the EPA eliminated respiratory protection, personal hygiene methods, waste removal, medical removal protection, and any emphasis on OSHA construction- related matters. Today, however, there are now many examples of quality training curriculums and programs that are comprehensive and that can be delivered in less than 16 hours. OSHA should include in the revised Standard, appendices of various field-tested curricula for varying levels of risk and required protections.

OSHA and EPA should harmonize training requirements

At the same time, EPA should ensure that their training includes understanding and implementing the OSHA LIC standard. These two agencies at the minimum need to harmonize their training so they at least compliment each other and help the contractor and worker understand what training is needed and required. They need to provide the contractor with a "one-stop" shopping approach to obtaining training for their employees.

In their recent proposed rule, EPA has seemingly ignored their own research findings and the vast amount of air sampling and lead contamination research compiled over the last 13 years. That data shows that dry manual sanding and scraping and open power sanding surface preparation along with hard demolition create high levels of airborne lead and, along with window replacement, exceed the limits for lead dust contamination. Other tasks are below the PEL and Action Levels and create lower levels of lead dust contamination.

One way to clarify this inconsistency is for OSHA and EPA to both require various levels of training that reflect more than 13 years of data collection aligned with similar work tasks located in the real world of construction. If a contractor wants to opt out of those

higher levels of training requirements then they must perform air and wipe sampling to document that they have learned to control those exposures through various means.

Worker vs. Foremen Training Needs

It should also be noted that the OSHA requirements make no distinction between workers and foremen or contractors with regard to information and training needs while EPA does for their current training regulations. Contractors and foremen clearly need training that covers their responsibilities under the OSHA LIC standard, even if they are unlikely to be exposed at or above the action level. Under these circumstances, it would be better to require foremen and contractors to take training focusing on the supervision of lead-exposed workers, steps they can take to reduce these exposures and how to conduct frequent and effective tailgate trainings. It would be important for OSHA to harmonize with EPA on this issue of different levels of training for workers vs. foremen and contractors.

For the small contractors and workers who primarily work in this area of residential painting and remodeling clearer simple guidance based on the work performed (and assuming lead is present) regarding training requirements and quality will help ensure a lead safe job and better protected workers and building occupants. Without it, the confusion we currently have will continue and compliance on the part of motivated contractors will further deteriorate.

If you have any comments contact:

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