



December 8, 2017

To: Kevin L Walder
Department of Labor and Industries
wake235@lni.wa.gov

Subject: Chapter 296-857 WAC, LEAD
protecting workers from occupational exposures to lead

Dear Kevin (and others interested):

Abstract

The continued indiscriminate use of lead has been disastrous for the health of children and adults. Revision of the work place lead regulation is an important step in protecting WA State workers and their families. Below I provide detailed information on the hazards of lead that support my position that the distinction between adult and childhood blood lead action levels should be eliminated. The Centers for Disease Control and Prevention (CDC) states that there is no safe level on lead exposure and sets blood lead action level of 5 µg/dL. The goal is to establish regulation that protect all workers to the unique challenges of lead exposure. Workers must include women of child bearing age and potentially pregnant as well as young adults 16-25 years of age. While the younger are more vulnerable to the many health effects of lead, the brain remains the most vulnerable organ particularly during ongoing development until the age 25. The cost of a damaged brain is incalculable for the individual and enormous for society. Society was and is responsible for the wide spread use and distribution of lead in the environment. We now have irrefutable knowledge of the health effects of lead and are thus responsible for the costs necessary for reducing exposure to lead where ever it might reside.

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The knowledge we have, implies an ethical responsibility to ensure that everyone can reach and maintain their full potential in an environment free of lead exposure.

Introduction

Thank you for the opportunity to provide comments in support of updating the two standards that are designed to protect workers from occupational exposures to lead:

- WAC 296-62-07521: General industry lead standard
- WAC 296-155-176: Lead in construction standard

The efforts of Washington State Department of Labor & Industries, Division of Occupational Safety and Health to address worker lead exposure is essential to provide the worker and their families a safe work and home environment.

I began researching the health effects of lead, particularly its effects on the developing nervous system, in 1976 and have long-standing interest and expertise in the detrimental health effects of lead exposure for both children and adults. In 2006, I co-authored the paper “A Rationale for Lowering the Blood Lead Action Level from 10 to 2 µg/dL” (Neurotoxicology Vol 27/5, September 2006, pp 693-701). While this paper focused primarily on children, the basic argument - that there is no safe level of lead exposure – is relevant for both adults and children. In 2012, the CDC effectively lowered the blood lead action level for children to 5 µg/dL, but also stated that there is no safe level of lead exposure. There has also been discussion about lowering the blood action level to below 5 µg/dL.

In 2017, I coauthored a paper on the health effects of occupational exposure to lead. . (Rachel M. Shaffer and Steven G. Gilbert. Reducing occupational lead exposures: Strengthened standards for a healthy workforce. NeuroToxicology November 2017. See <https://doi.org/10.1016/j.neuro.2017.10.009>). This paper updates that hazards of low level lead exposure and provides a full set of references.

An often over looked exposure to lead occurs at shooting ranges. Law enforcement, hunters, military personnel, recreational shooters, and range workers are potentially exposed to lead and associated health hazards. Across the US there are over 1 million law enforcement personnel that train regularly at indoor shooting ranges. In addition, there are an estimated 20 million recreational firearm shooters. There are an estimated 16,000-18000 firing ranges across the US. Shooters are exposed to lead which can also be taken home to expose their family.

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Shooters have a right to environment free of lead to ensure the health and safety of themselves and their family.

The current occupational lead standards are based on outdated medical and scientific information and do not adequately protect workers or their families. Washington State should update these standards as soon as possible. We have been studying the health effects of lead for decades, and have sufficient and irrefutable knowledge about the hazards as well as appropriate technology to protect Washington workers; we need to take action.

To protect workers, their families, the public, and the environment, there is overwhelming medical and scientific support for the following:

1) The use of air lead levels as a trigger for worker protection should be ended.

The mere presence of lead in the work place should be an adequate trigger to require implementation of protective action. The additional effort and expense to conduct air monitoring does not provide significantly different or additional information that would change the need to take action to control exposures. If there is lead in the environment and/or the work space, then appropriate safety measure should be taken immediately.

2) Blood lead levels should be routinely monitored and reported to L&I.

The BLLs of workers should be routinely monitored if there is any lead in the work environment. XRF technology has made environmental assessments for lead easier and cheaper to do. In the last decade assessment of blood lead levels has become much cheaper to obtain and provide more accurate information. Establishing a robust database will allow L&I to promptly address exposures of concern and mitigate potential health effects. Furthermore, an elevated BLL in a worker should trigger education and a request to assess BLL of family members, particularly children.

3) A worker with a blood lead level above 5 µg/dL should be removed from the workplace.

To ensure a safe and health work environment a worker should be removed from the work environment if a BLL exceeds 5 µg/dL. There are several good reasons to establish this as a protective level that will prevent lead exposure and protect the worker and their family.

First, it removes the false dichotomy between children and worker's health and well-being. This level emphasizes the serious nature of lead exposure and moves to protect

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all individuals. Kids should not be used as sentinel (the canary in the coal mine) for take home lead exposure. Reducing worker lead exposure not only protects the worker but acts as primary prevention of lead exposure for a worker's child. It should be noted that there is no safety factor built into a level of 5 µg/dL.

An adult male worker weighs far more than a child and probably more than most women on the job site. Weight matters as it takes much less lead exposure to get a child BLL above 5 µg/dL than the adult. A worker with an elevated BLLs is likely taking this lead home, contaminating her car and household, and exposing her children. The developing nervous systems means children are more vulnerable to the effects of lead than adults. In addition, an adult absorbs about 10% of the lead he/she ingests, but a child absorbs about 50% of the lead he/she ingests.

The workplace must be safe environment for all workers, including women of child-bearing age, pregnant women, or younger workers. Any individual that is still growing absorbs lead more easily because lead substitutes for calcium and is incorporated into the bone. This bone lead can be liberated during pregnancy and affect the developing infant. A pregnant woman also absorbs more lead because of the developing infants greater need for calcium. Thus, to protect all workers and their families, workers should be removed from the workplace when a BLL reaches 5 µg/dL or above.

4) **Acknowledge lead use or contamination.**

It is my understanding that acknowledging lead contamination to contractors or upon a sale is not legally required. By contrast, analogous asbestos contamination must be acknowledged. Thus, a similar rule should be in place for lead.

Additional Supporting Information

No Safety factor

The history of lead research is one of constant recognition of adverse health effects at ever lower exposure levels. Despite the ongoing research and regulation, a reasonable safety factor has never been applied to lead exposure or blood lead levels as a biomarker of exposure. Safety factors are designed to protect sensitive individuals and account for uncertainty in research. There is little uncertainty with regard to the hazardous of lead exposure while there is recognition of sensitive individuals. The current draft rule would require removal at a blood lead level of 20 ug/dL. A safety factor of 10 would require removal at a blood level of 2 ug/dL.

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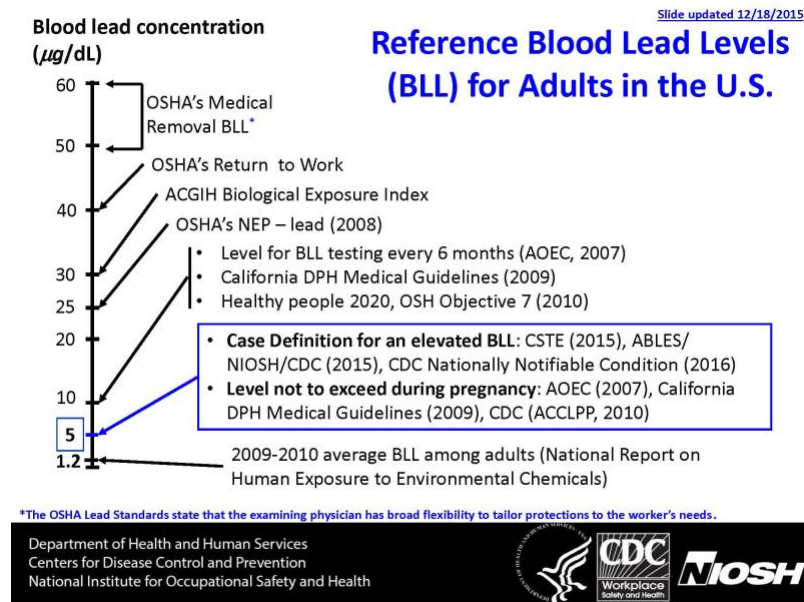
This would protect sensitive individuals such as women of child bearing age and younger workers. The lower removal level would also protect children from the effects of take home lead exposure.

Current Blood Lead Action Levels

The current OSHA standards were adopted by WA State and are grossly inadequate. OSHA regulates workplace lead exposure through two standards, the general industry standard and the construction standard. Both of these are based on scientific and medical evidence from the 1970s and do not reflect updated information regarding the hazards of low level lead exposure.

Examples of key inadequacies of the current standards are outlined below:

- Exposures of lead that result in up to 60 µg/dL BLLs (or an average of 50 µg/dL BLL on three or more tests) are allowed before medical removal is required
- Workers can return to work when BLLs are as high as 40 µg/dL
- The permissible enforceable limit (PEL) is set at 50 µg/m³ over 8 hours, which allows for BLLs as high as 60 µg/dL
- Reliance on air lead levels as entry condition for the occupational lead standard ignores the role of ingestion in worker lead exposure



As can be seen in the above figure, several organizations state that during pregnancy a women's blood lead level should not exceed 5 µg/dL. (references see Shaffer and Gilbert, 2017).

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Sensitive Individuals / Whose more vulnerable

It is well established that children are more vulnerable to lead exposure than adults, but when does a child become an adult. It is also important to consider at what age children can start working. Women of child bearing age and pregnant women are also uniquely vulnerable to lead exposure and passing lead to their children. Let's first quickly review why children are more vulnerable to low level lead exposure. Not only did we not evolve to protect ourselves from lead exposure, lead substitutes for calcium make us more vulnerable. During active growth of children or during pregnancy the body needs more calcium so we adapt and absorb more calcium. This means that during growth periods we will absorb approximately 50% of the lead we ingest as compared to an adult male that will absorb about 10% of the lead. Lead we do ingest can be stored in bone because of the substitution for calcium. The bone lead can be released during times of high calcium demand such as pregnancy and thus passed to the next generation. It is also important to note that for any exposure the less you weigh the greater the dose of lead. The developing nervous system as well as other developing organs are also more vulnerable to the effects of lead.

Estimate of Childhood lead exposure – Take home lead exposure

Children are uniquely vulnerable to the effects of lead because of their developing nervous systems and high calcium needs. Existing occupational lead standards are severely outdated and allow exposures that result in BLL up to 40-60 µg/dL. The Occupational Safety and Health Administration (OSHA) estimates that approximately 804,000 workers in general industry and an additional 838,000 workers in construction are potentially exposed to lead. Workers are exposed to lead as a result of the production, use, maintenance, recycling, and disposal of lead material and products, construction, manufacturing, wholesale trade, transportation, remediation and recreation such as fishing, hunting, and firing ranges. To demonstrate the importance of updating federal and WA state lead standards, we perform example calculations that estimate the number of children exposed to lead through occupational exposure. Assuming only 10% of possible workers exposed to excessive amounts of lead bring contamination into the home, there would be 160,000 potential opportunities of family lead exposure. If each of these families had only one child exposed to take-home lead, then occupational lead exposure would contribute to elevated childhood lead exposure across the country. This does not include the millions of people that use gun firing ranges, which also accounts for occupational and non-occupational lead exposure. Therefore, to adequately protect workers and their families, occupational lead standards should be updated to prevent BLLs greater than 5 µg/dL.

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3711 47th Place NE, Seattle, WA 98105

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Age of first working / age of development

Washington State labor rules restrict the type of work those under 18 can do or chemicals exposed to. Work activities teens are prohibited from doing in non-agricultural jobs can be found here -

<http://www.lni.wa.gov/WorkplaceRights/TeenWorkers/Prohibited/default.asp>. However, you are considered an adult once you turn 18 years of age there are no additional restrictions despite ongoing development. The brain and nervous system continue to develop until about 25 years of age. Bone can also continue develop after 18 thus making lead uptake greater. Entry level jobs requiring little skill are often the more contaminated work sites. Young men and women must receive adequate training in an appropriate language and lead monitoring.

Home an extension of the work place

The issue of a working contaminating the car or home with lead from the work place is well known and documented. In essence the home should be considered an extension of the work place and should be protected from lead.

Conclusion

To adequately protect future generations of Washingtonians, their blood lead levels must be kept below 5 µg/dL. The work place lead exposure regulation should reflect a 5 µg/dL standard.

Thank you for giving my comments consideration.

Sincerely,



Steven G. Gilbert, PhD, DABT

Director

INND (Institute of Neurotoxicology & Neurological Disorders)

3711 47th Place NE

Seattle, WA 98105

E-mail: sgilbert@innd.org

INND

3711 47th Place NE, Seattle, WA 98105

sgilbert@innd.org – www.toxipedia.org – www.asmalldoseof.org – www.wanmec.org

Limited References

Steven G. Gilbert and Bernard Weiss. A Rationale for Lowering the Blood Lead Action Level From 10 to 2 µg/dL. *Neurotoxicology* Vol 27/5, September 2006, pp 693-701.
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