



October 27, 2022

Mr. Doug Parker
Assistant Secretary of Labor
Occupational Safety and Health Administration
U.S. Department of Labor

RE: Advance Notice of Proposed Rulemaking on blood lead level for medical removal
Docket No. OSHA–2018–0004 (87 *Federal Register* 38343, June 28, 2022)

Dear Assistant Secretary Parker:

On behalf of the American Public Health Association, a diverse community of public health professionals that champions the health of all people and communities, we concur that there is an immediate need to update the OSHA lead standard. In 2017, we adopted a policy statement calling on OSHA to strengthen its lead standard.¹ We are pleased to see OSHA taking an initial step in that direction with its advanced notice of proposed rulemaking (87 *Federal Register* 38343) and we support this effort. These comments were developed in collaboration with members of APHA’s Occupational Health and Safety Section.

OSHA’s current permissible exposure limit and medical removal requirements are not sufficiently protective of workers’ health as they do not protect against cardiovascular and reproductive risks associated with blood lead concentrations experienced by workers. As OSHA notes in the ANPRM, California and Washington have invested considerable effort in updating their occupational lead standards. OSHA should show leadership on this matter as well.

We appreciate the opportunity to provide responses to some of the questions posed in the ANPRM.

Question #1 (Lower the blood lead level that prompts medical removal protection)

APHA concurs with OSHA that significant adverse health effects are associated with blood lead concentrations that are below the agency’s current requirements for medical removal. The National Toxicology Program indicates that blood lead levels below 10 µg/dl are linked to adverse health outcomes in adults.² In 2015, NIOSH designated 5 µg/dl as the case definition of an elevated blood lead level for workers and noted that this level should not be exceeded during

¹ American Public Health Association. (2017). Strengthening the Occupational Health and Safety Administration Standards for Inorganic Lead to Protect Workers' Health. <https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2018/01/18/strengthening-standards-for-inorganic-lead>

² U.S National Toxicology Program (2012) Monograph: Health Effects of Low-level Lead. Washington, D.C.: U.S Department of Health and Human Services.

pregnancy.³ Lower exposures and corresponding reduced employee blood lead levels are possible to achieve with the substitution of safer materials, engineering controls, stringent housekeeping practices, worker training, and personal protective equipment. For example, lead-free alloys are used by the military and promoted by the Electronics Manufacturers Association to replace lead-based solders.⁴ Improved hygiene practices for employees and the work environment lead to decreasing blood lead levels.^{5,6,7,8}

It is widely acknowledged that the current medical removal trigger for elevated blood lead levels exceed those known to cause hypertension in adults. Lead exposures are responsible for more than 440,000 from ischemic heart disease and cardiovascular disease in the U.S. every year.⁹ With cardiovascular disease being a leading cause of death in the U.S., mandates by OSHA to reduce lead exposures and provide medical removal protection is consistent with the agency's public health role.

Question #5 (Additional criteria to trigger blood lead testing)

OSHA should consider additional criteria for blood lead testing requirements beyond concentrations of lead in air, such as those proposed by California and the state of Washington. These proposals would direct employers to evaluate worker exposure to lead using biomonitoring methods established through exposure control plans using task-based assessments.^{10,11} These will provide protection to employees tailored for the risk associated with each task. Improved work practices, engineering controls such as ventilation, and blood lead biomonitoring should result from the evaluation of potential hazard generated by altering or

³ National Institute for Occupational Safety and Health. (2021) Adult Blood Lead Epidemiology and Surveillance (ABLES), BLL Reference Guide. Accessed at: <https://www.cdc.gov/niosh/topics/ables/ReferenceBloodLevelsforAdults.html>.

⁴ Ames Laboratory. (2012). Lead-free solder becomes top income-generating technology in Ames Lab and ISU history. Available at: <https://www.ameslab.gov/news/news-releases/lead-free-solder-becomes-top-income-generating-technology-in-ames-lab-and-isu>.

⁵ Scott E, Pavelchak N, DePersis R. Impact of housekeeping on lead exposure in indoor law enforcement shooting ranges. *J Occup Environ Hyg.* 2012;9:D45–D51.

⁶ Navy Environmental Health Center. (2002). Indoor firing ranges industrial hygiene technical guide. Available at: http://www.med.navy.mil/sites/nmcphc/Documents/industrial-hygiene/indoor_firing_range.pdf. Accessed December 31, 2017.

⁷ Sato M, Yano E. The association between lead contamination on the hand and blood lead concentration: a workplace application of the sodium sulphide (Na₂S) test. *Sci Total Environ.* 2006;363:107–113.

⁸ Chuang H, Lee M, Chao K, Wang J, Hu H. Relationship of blood lead levels to personal hygiene in lead battery workers: Taiwan, 1991–1997. *Am J Ind Med.* 1999;35:595–603.

⁹ Lanphear BP, Rauch S, Auinger P, et al. Low-level lead exposure and mortality in US adults: a population-based cohort study. *The Lancet Public Health.* 2018; 3(4): e177-e184.

¹⁰ Washington State. (2016, Oct. 12). Updating the occupational lead standards in Washington State. Department of Labor and Industries. <https://lni.wa.gov/safety-health/safety-rules/rulemaking-stakeholder-information/leaddocs/LeadRule-OccupationalLeadStandardsObjective.pdf>.

¹¹ California Environmental Protection Agency. (2013). Estimating workplace air and worker blood lead concentration using an updated physiologically-based pharmacokinetic (PBPK) model. <https://oehha.ca.gov/air/document/estimating-workplace-air-and-worker-blood-lead-concentration-using-updated-pbpk-model>.

disturbing lead-containing materials. Requirements to improve work practices should not solely be triggered by personal air monitoring results.

Question #11 (Notification of blood lead testing results)

APHA recommends that the results of blood lead tests be provided to the employers (as is current practice) but also provided at the same time to employees directly from the laboratory, physician or other licensed health professional. The employer should not serve as the intermediary. Blood lead results provided to workers should be accompanied by information on the harms of lead exposure, control measures that employers need to adopt to address the source of the exposure, rights concerning medical removal and more robust whistleblower protections.

Question #14 and #22 (Need to revise the antiquated OSHA lead standard)

OSHA's current PEL and medical removal requirements are not protective of workers' health, a pregnant worker's fetus and contribute to take-home lead exposures.^{2,12,13,14} Because serious health effects of lead at low levels are well documented and lead exposure is preventable, APHA's policy statement recommends that occupational lead standards: 1) reduce the concentrations of lead in air that trigger regulatory action; 2) lower the blood lead level that prompts medical removal from work; 3) enhance medical monitoring for lead-related health problems; and 4) implement other improvements for protective clothing, hygiene practices, training and education.¹ An updated OSHA standard should be designed to ensure that a worker's blood lead level should be as low as possible and not exceed 5 µg/dl.

Occupational lead standards should more fully address reproductive effects. Lead exposure is associated with impaired hormone production and semen quality.¹⁵ Pregnant workers and workers who may become pregnant are particularly vulnerable to the effects of lead as they, their fetuses, and their offspring are at risk of adverse health effects even at low blood lead concentrations.

Prenatal lead exposures are associated with adverse cognitive impacts on offspring, and maternal blood levels <5 µg/dl are associated with reduced fetal growth.² Blood lead levels of <10 µg/dl are associated with hypertension in pregnancy, increased risk of spontaneous abortion and preterm birth.² A 2017 systematic review and meta-analysis found "an increase of 1 µg/dl [in blood lead levels is] associated with a 1.6% increase in likelihood of preeclampsia, which

¹² Centers for Disease Control and Prevention. Fourth National Report on Human Exposure to Environmental Chemicals Updated Tables, January 2017, Volume One. Blood Lead, p. 261. https://www.cdc.gov/biomonitoring/pdf/FourthReport_UpdatedTables_Volume1_Jan2017.pdf.

¹³ California Department of Public Health (2017). Occupational Health Branch, Occupational Lead Poisoning Prevention Program. Blood Lead Levels in California Workers, Data Reported to the California Occupational Blood Lead Registry (2012-2014). <http://www.cdph.ca.gov/programs/olppp/Documents/CABLLReport2012-14.pdf>.

¹⁴ Kosnett M, Wedeen R, Rothenberg S, et al. Recommendations for medical management of adult lead exposure. *Environ. Health Perspect.* 2007;115(3):463-471.

¹⁵ Kumar S. Occupational and environmental exposure to lead and reproductive health impairment: An overview. *Indian J Occup Environ Med.* 2018;22(3):128-137.

appears to be the strongest risk factor for preeclampsia yet reported.”¹⁶ OSHA should include additional training requirements for all lead exposed workers, including information on the full range of adverse health effects, including impact on male fertility.¹⁵

Infants and children of workers are also at risk of lead exposure through breastfeeding and take-home lead exposures. It is well documented that a substantial portion of U.S. childhood lead poisoning cases are attributable to lead brought into the home from the workplace of parents and guardians. In Florida, 13.4% of childhood lead poisoning cases reported from 2010 to 2014 had identified take-home lead exposures.¹⁷ A Michigan study demonstrated that workers in lead battery and scrap metal recycling industries, and firing ranges had lead dust levels in their personal vehicles that exceeded the EPA standard for lead dust in homes. The geometric mean levels identified were up to 330 times the EPA limit.¹⁸ Other studies have shown that children of construction workers have higher blood lead levels than comparison groups.¹⁹ A study in the Boston area found that construction workers have elevated levels of lead in their household dust.²⁰

There is widespread agreement in the public health and medical communities that there is no safe level of lead in blood and the best strategy to reduce the harm to adults and children is to prevent exposure in the first place. A recent investigation by the *Tampa Bay Times* in which 16 children had elevated blood lead levels most likely caused by their parents’ employment at recycling facility and lead smelter.²¹ Local and state health departments have also identified lead poisoning among children whose relatives are employed at recycling plants.^{22,23} Children exposed to lead are at risk of IQ decrements, behavioral problems, decreased academic performance, delayed puberty and reduced postnatal growth.² Due to multiple sources of lead in the environment and inadequate efforts in addressing environmental injustice, non-Hispanic Black children have

¹⁶ Poropat AE, Laidlaw MAS, Lanphear B, et al. Blood lead and preeclampsia: a meta-analysis and review of implications. *Environ. Res.* 2018;160:12-19.

¹⁷ Rajagopalan, S. Take-Home Lead Exposure Among Children in Florida 2010-2014. 2016 CSTE Annual Conference. Council of State and Territorial Epidemiologists.

¹⁸ Oliveri AN, Fagerstrom LA, Wang L, et al. A county-level program for the evaluation of the potential for take-home lead exposures among children in Michigan. *Public Health Reports.* 2021 Dec. 17;00333549211061327.

¹⁹ Whelan EA, Piacitelli GM, Gerwel B, et al. Elevated blood lead levels in children of construction workers. *Am J Pub Health.* 1997;87(8):1352-1355.

²⁰ Ceballos DM, Herrick RF, Dong Z, et. al. (2021). Factors affecting lead dust in construction workers’ homes in the greater Boston area. *Environ Res.* 2021;195:110510. doi: 10.1016/j.envres.2020.110510

²¹ Johnson CG, Woolington R, Murray E. Poisoned. *Tampa Bay Times.* March 24, 2021. <https://projects.tampabay.com/projects/2021/investigations/lead-factory/gopher-workers>,

²² Newman N, Jones C, Page E, et. al. Investigation of childhood lead poisoning from parental take-home exposure from an electronics scrap recycling facility, Ohio, 2012. *Morbidity and Mortality Weekly Report.* 2015; 64(27):743-745.

²³ García BR, Rullán J, O’Neill M, et. al. Take-home lead exposure among children with relatives employed at a battery recycling facility—Puerto Rico, 2011. *Morbidity and Mortality Weekly Report.* 2012; 61(47):967-970.

higher blood level levels than non-Hispanic white children.²⁴ The risk of take-home lead dust likely contributes to this disparity. Given the evidence linking workplace exposures to childhood lead poisoning, it is essential that OSHA update the lead standard and acknowledge that exposure reductions in the workplace can contribute to efforts to prevent childhood lead poisoning. A goal of the revised standard should be to eliminate these preventable take-home exposures.

Other potentially vulnerable populations that should be considered from a health equity perspective include workers of color and foreign-born workers. For example, there is evidence that Hispanic and foreign-born workers may be at increased risk of lead exposure likely due to the industries in which they work. The California Occupational Lead Poisoning Prevention Program has found that workers with a Hispanic surname are overrepresented among workers with blood lead levels $\geq 5 \mu\text{g}/\text{dl}$.²⁵ In King County (Seattle) Washington, there is evidence that workers of color experience higher rates of lead poisoning in both general industry and in construction trades.¹⁰

Question #14 (Reduce the concentrations of lead in air that trigger regulatory action)

APHA would strongly support OSHA's efforts, including a more protective PEL, to reduce the concentrations of airborne lead that would trigger regulatory action. Pharmacokinetic modeling conducted by the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment indicates that a PEL for lead should not exceed an 8-hour time-weighted average of $2.1 \mu\text{g}/\text{m}^3$ to ensure blood lead levels remain below $10 \mu\text{g}/\text{dl}$ in 95% of workers over a working lifetime.¹¹ Workplace exposure standards should be designed to maintain worker exposures well below levels known to cause serious adverse health effects. Since lead is one of the most extensively studied occupational hazards, and the evidence linking low exposure levels to adverse health effects is strong, it is contrary to public health to permit these risks to persist. OSHA should adopt of PEL of no higher than $5 \mu\text{g}/\text{m}^3$ and an action level of $2 \mu\text{g}/\text{m}^3$.

Compliance Program Plans

APHA's 2017 policy statement calls on employers to eliminate the use of lead in workplaces, when possible. Safer alternatives to lead in industrial paints, plastics, ammunition, solder, pigments, and other chemicals are available. This includes at gun ranges where jacketed, lead-

²⁴ Teye SO, Yanosky JD, Cuffee Y, et. al. Exploring persistent racial/ethnic disparities in lead exposure among American children aged 1-5 years: results from NHANES 1999-2016. *Int Arch Occup Environ Health*. 2021; 94(4), 723-730.

²⁵ Payne S, Jackson R, Materna B. (2016). Blood Lead Levels in California Workers: Data Reported to the Occupational Blood Lead Registry, 2012—2014. California Department of Public Health, Occupational Health Branch.

<https://www.cdph.ca.gov/Programs/CCDCPHP/DEODC/OHB/OLPPP/CDPH%20Document%20Library/CABLLReport2012-14.pdf>.

free and lead-free primers on bullets can be used²⁶; in automotive repair using non-lead wheel weights and in production of PVC wire and cable coatings.²⁷

Employers should explain to workers and their representatives the efforts taken to eliminate the use of lead in their workplace. Employer compliance program plans which are already required under OSHA's lead standard²⁸ should be required to include information on efforts to identify substitution products or ingredients without lead and plans for transitioning to safer alternatives. In addition, employers should be required to make their written compliance plan available to all employees, not only those deemed by the employer to be "affected employees" (as is the case in the current OSHA standard).

OSHA staff working on this advanced rulemaking activity may also find it helpful to review information from the OSHA Training Institute Education Centers' course, "Transitioning to Safer Chemicals." It is designed to assist and provide employers with hands-on experience with processes, key methods, tools, databases, and resources to promote substitutions. (The OSHA 7225 manual and the OTI course refer to a case study on a substitution for lead²⁷).

OSHA's lead standard was a landmark public health intervention when it was issued in 1978. It was instrumental in reducing work-related blood lead levels and resulting adverse health effects and take-home exposures. After more than 40 years of scientific evidence of harm and advances in engineering controls, a more protective occupational health standard on lead is needed. We call on OSHA to revise its lead standard to protect workers, their families and ultimately the public at-large.

Sincerely,



Georges C. Benjamin, MD
Executive Director

²⁶ U.S. Occupational Safety and Health Administration. (2018). Protecting workers from lead hazards at indoor firing ranges. <https://www.osha.gov/sites/default/files/publications/OSHA3772.pdf>.

²⁷ Toxic Use Reduction Institute.(2006). Chapter 3: Lead and Lead Compounds in Five Chemicals Alternative Assessment Study. <https://www.turi.org/content/download/8713/145357/file/2006+M%26P+Report+Special+Five+Chemicals+Alternatives+Assessments.pdf>.

²⁸ U.S. Occupational Safety and Health Administration. Lead Standard. 29 CFR 1910.1025(e)(3).