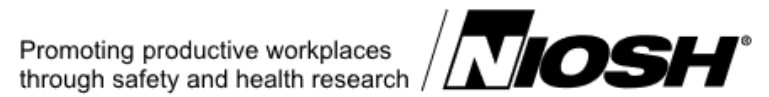




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Adult Blood Lead Epidemiology and Surveillance (ABLES)

Understanding Blood Lead Levels

Blood lead levels (BLLs) are measured by taking a blood sample. They indicate if a person was exposed to lead. By checking a worker's blood lead level, occupational safety and health professionals can see if workers are protected from lead or not. In the cases where BLLs are elevated, evaluating these levels also helps healthcare providers decide on the best treatment.

BLL Reference Guide

There are several regulations and recommendations related to blood lead levels among workers.

Regulations Versus Recommendations Related to Adult Lead Exposure in the Workplace

Regulations	Blood lead levels (BLL)	Recommendations
Occupational Safety and Health Administration's (OSHA) medical removal BLL* for general industry →	60 µg/dL	
OSHA's medical removal BLL* for construction →	50 µg/dL	
OSHA's return to work →	40 µg/dL	
	30 µg/dL	Association of Occupational and Environmental Clinics (AOEC), California Department of Public Health (CDPH), American College of Occupational and Environmental Medicine (ACOEM) and Michigan Occupational Safety and Health Administration (MIOSHA) recommend medical removal at 30 µg/dL.
	25 µg/dL	OSHA's National Emphasis Program for lead determined BLLs at 25 µg/dL among workers in high risk industries shall be considered serious and must be handled by inspection.
	20 µg/dL	American Conference of Governmental Industrial Hygienists (ACGIH®) Biological Exposure Index states a typical worker can experience this level without adverse health effects.
	15 µg/dL	MIOSHA recommends BLL testing every 2 months for employees found to have a BLL of 15 µg/dL or higher.
	10 µg/dL	ACOEM and CDPH recommends BLL testing every 2 months.
Case definition for an elevated BLL →	5 µg/dL	← Women should not exceed 5 µg/dL during pregnancy.
The average blood lead level among adults in 2015–2016. →	0.92 µg/dL	

*The OSHA Lead Standards state that the examining physician has broad flexibility to tailor protections to the worker's needs.

0.92 µg/dL In 2015-2016, this was the typical BLL among adults in the United States.¹

5 µg/dL Five µg/dL is the case classification ABLES uses to indicate an elevated BLL for surveillance purposes.³

If the BLL is between 5 to 9 µg/dL, California Department of Public Health (CDPH) recommends repeating BLLs every 3 months for adults until their BLL is less than 5 µg/dL.⁴

If pregnant, women should not exceed this level because the National Toxicology Program (NTP) concluded that mothers with BLLs even lower than this level can result in reduced fetal growth.²

The American College of Occupational and Environmental Medicine (ACOEM) also states it is inadvisable to allow pregnant workers, or those who are trying to or may become pregnant, continued exposure if BLL is >5 µg/dL and medical removal is recommended; pregnant workers may return to work when two repeat BLLs are <5 µg/dL.⁵

10 µg/dL

Below 10µg/dL, the NTP concluded lead increases blood pressure, the risk of hypertension, and the incidence of essential tremor.

ACOEM and CDPH recommend repeat BLL tests every two months if a person's BLL results are between 10 to 19 µg/dL.⁶

15 µg/dL

Michigan Occupational Safety and Health Administration (MIOSHA) requires BLL testing every 2 months for employees found to have a BLL of 15 µg/dL or higher.

20 µg/dL

ACOEM and CDPH recommend medical removal if a worker has two consecutive BLLs between 20-29 µg/dL.

The American Conference of Governmental Industrial Hygienists (ACGIH®) guideline states that the typical worker can experience a BLL of 20 µg/dL without adverse health effect.⁷ This guideline is intended for use in the practice of industrial hygiene, but others may wish to use these guidelines as supplements to occupational safety and health programs.

25 µg/dL

ACOEM and CDPH recommend medical removal if a worker has two consecutive BLLs between 20-29 µg/dL.

The Occupational Safety and Health Administration (OSHA) considers a BLL of 25 µg/dL as serious and must be handled by inspection. This determination was based on [OSHA's National Emphasis Program \(NEP\) for Lead](#) [↗](#), which was released to protect the health and safety of workers in industries determined to pose a higher risk to people and the environment.

30 µg/dL

MIOSHA requires medical removal at 30 µg/dL.

ACOEM and CDPH recommend that workers be medically removed from work with lead exposure if one BLL exceeds 30 µg/dL.

ACOEM, CDPH, and MIOSHA have issued more stringent and health protective limits than other federal and state-based regulatory groups.


40 µg/dL





If an employee has been medically removed from work based on a previously high BLL, OSHA permits the employee to return to work once 2 consecutive BLLs are measured below 40 µg/dL.

50-60 µg/dL



At a BLL of 50-60 µg/dL, OSHA requires medical removal.



The employer must remove any employees exposed to lead in the workplace if their BLL is 50 µg/dL or more for workers in construction, or 60 µg/dL or more for workers in general industry.



¹ Centers for Disease Control and Prevention (CDC) [2019] [Fourth national report on human exposure to environmental chemicals, updated tables, January 2019](#). Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention 

² Association of Occupational and Environmental Clinics (AOEC)  [2007]  [Medical management guidelines for lead-exposed adults, revised 4/24/2007](#)   . Washington, D.C.

California Department of Public Health [2019] [Health-based guidelines for blood lead levels in adults 2019](#)   . Richmond, CA.





National Institute for Environmental Health Services (NIEHS) [2012] [National Toxicology Program NTP Monograph: Health effects of low-level lead](#).   Research Triangle Park, NC: U.S. Department of Health and Human Services, National Institutes of Health.



Holland MG, Cawthon D, American College of Occupational and Environmental Medicine (ACOEM) Task Force on Blood Lead Levels [2016] [ACOEM position statement: Workplace lead exposure](#)   . JOEM 58(12): e371-374.

³ Council of State and Territorial Epidemiologists (CSTE) [2015], [Public health reporting and national notification for elevated blood lead levels](#).   Atlanta, GA.


CDC [2016] National Notifiable Diseases Surveillance System (NNDSS), Lead, elevated blood lead level. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

California Department of Public Health [Medical management of lead-exposed adults](#)  . Sacramento, CA. Page last updated 11/19/2020.

⁴ California Department of Public Health [2019] [Health-based guidelines for blood lead levels in adults 2019](#)   . Richmond, CA.⁵ Holland MG, Cawthon D, American College of Occupational and Environmental Medicine (ACOEM) Task Force on Blood Lead Levels [2016] [ACOEM position statement: Workplace lead exposure](#)   . JOEM 58(12): e371-374.

⁶ California Department of Public Health [2019] [Health-based guidelines for blood lead levels in adults 2019](#)   . Richmond, CA.

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⁷ American Conference of Governmental Industrial Hygienists (ACGIH®) [Last revised April 2012] [Biological Exposure Indices \(BEI®\) Introduction](#)  Cincinnati, OH. Page visited 2/1/2021.

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