

DEPARTMENT OF INDUSTRIAL RELATIONS
Occupational Safety and Health Standards Board
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TITLE 8. CALIFORNIA CODE OF REGULATIONS

Construction Safety Orders Section 1532.1 and General Industry Safety Orders Sections 5155 and 5198 (Published on March 3, 2023)

Lead

NOTICE IS HEREBY GIVEN that the Occupational Safety and Health Standards Board (Board) proposes to adopt, amend or repeal the foregoing provisions of title 8 of the California Code of Regulations in the manner described in the Informative Digest, below.

PUBLIC HEARING

The Board will hold a public hearing starting at 10:00 a.m. on **April 20, 2023**, in the Byron Sher Auditorium of the Cal/EPA Building, 1001 I Street, Sacramento, CA 95814 as well as via the following:

- Video-conference at www.webex.com (meeting ID 268 984 996)
- Teleconference at (844) 992-4726 (Access code 268 984 996)
- Live video stream and audio stream (English and Spanish) at <https://videobookcase.com/california/oshsb/>

At this public hearing, any person may present statements or arguments orally or in writing relevant to the proposed action described in the Informative Digest.

WRITTEN COMMENT PERIOD

In addition to written or oral comments submitted at the public hearing, written comments may also be submitted to the Board's office. The written comment period commences on **March 3, 2023**, and closes at 5:00 p.m. on **April 20, 2023**. Comments received after that deadline will not be considered by the Board unless the Board announces an extension of time in which to submit written comments. Written comments are to be submitted as follows:

By mail to Sarah Money, Occupational Safety and Health Standards Board, 2520 Venture Oaks Way, Suite 350, Sacramento, CA 95833; or

By e-mail sent to oshsb@dir.ca.gov.

AUTHORITY AND REFERENCE

Labor Code (LC) section 142.3 establishes the Board as the only agency in the State authorized to adopt occupational safety and health standards. In addition, LC section 142.3 requires the adoption of occupational safety and health standards that are at least as effective as federal occupational safety and health standards and permits the Board to prescribe, where appropriate, suitable protective equipment and control or technological procedures to be used in connection with occupational hazards and provide for monitoring or measuring employee exposure for their protection.

In June 2019, the state legislature passed and the governor signed Senate Bill (SB) 83, which, among other things, amended the LC by creating new section 6717.5, which took effect on June 27, 2019.

LC section 6717.5 requires the Department of Industrial Relations (DIR), Division of Occupational Safety and Health (Division or Cal/OSHA) to submit to the Board a rulemaking proposal to revise the lead standards of the General Industry Safety Orders (GISO) and the Construction Safety Orders (CSO), consistent with scientific research and findings. This rulemaking proposal provides specific revisions to the lead standards of the GISO and the CSO that comply with the requirements of LC section 6717.5.

INFORMATIVE DIGEST OF PROPOSED ACTION/ POLICY STATEMENT OVERVIEW

Existing law establishes requirements designed to protect the health and safety of employees who are occupationally exposed to lead. These requirements are found in title 8, California Code of Regulations (CCR), section 1532.1 of the CSO and sections 5155 and 5198 of the GISO.

The Board proposes to adopt amendments to title 8, CCR, section 1532.1 of the CSO, and sections 5155 and 5198 of the GISO. The proposed amendments are needed to adequately protect employees who have occupational exposure to lead. Existing requirements in sections 1532.1, 5155 and 5198 are based on lead toxicity information and medical and epidemiological data that is now more than 40 years old. More recent evidence demonstrates that even at exposure levels well below those currently allowed by the existing regulations, harmful health effects can occur.

Existing title 8 regulations establish a permissible exposure limit (PEL) for lead of 50 micrograms of lead per cubic meter of air ($\mu\text{g}/\text{m}^3$), as an 8-hour time-weighted average (TWA) concentration (1532.1(c); 5198(c); 5155 Table AC-1). TWA is a method used in the field of occupational safety and health to calculate a worker's daily exposure to hazardous substances. Eight-hour TWA values are calculated by taking the total exposure to a hazardous substance during a workday and dividing that total by eight hours. In addition, Cal/OSHA's lead regulations establish an action level for lead of 30 $\mu\text{g}/\text{m}^3$ (1532.1(b); 5198(b)); hygiene requirements for employees exposed above the PEL (1532.1(i); 5198(i)); medical surveillance requirements based on employee exposure at or above the action level for more than 30 days per year (1532.1(j); 5198(j)); and a medical removal level of 50 micrograms of lead per

deciliter ($\mu\text{g}/\text{dl}$) of whole blood (1532.1(k); 5198(k)). The existing Cal/OSHA regulations for lead are based on federal regulations that were promulgated in 1978 for Lead in General Industry and 1993 for Lead in Construction.

In 2010 and 2013, the California Department of Public Health made health-based recommendations to Cal/OSHA for revising the Lead Standards (for Construction and for General Industry) for the protection of workers who are exposed to lead on the job.

As a result of these recommendations, Cal/OSHA initiated the present rulemaking. Cal/OSHA developed this proposal with the assistance of advisory stakeholders by means of six advisory committee meetings and the release of multiple discussion drafts to ensure the proposal provides sufficient protection for employees while providing employers with sufficient flexibility to address these risks in the least burdensome manner.

This proposal is designed to maintain employee blood lead levels (BLLs) below $10 \mu\text{g}/\text{dl}$, whereas existing regulations were designed to maintain employee BLLs below $40 \mu\text{g}/\text{dl}$, a level four times higher. To achieve this goal, the proposed amendments would (1) reduce exposure to airborne lead; (2) reduce exposure to lead through the oral route of exposure; and (3) expand requirements for blood lead testing of employees who work with lead.

The proposed amendments would revise the requirements of section 1532.1. Principal revisions of existing requirements would include:

- (1) lowering the action level, which triggers certain required protective measures, from $30 \mu\text{g}/\text{m}^3$ as an 8-hour TWA to $2 \mu\text{g}/\text{m}^3$ as an 8-hour TWA (*subsection (b)*);
- (2) adding and defining the terms “altering or disturbing,” “blood lead level,” and “high-efficiency particulate air (HEPA) filter” (*subsection (b)*);
- (3) adding and defining the terms “level 1 trigger task,” “level 2 trigger task,” “level 3 trigger task,” and “trigger task - not listed,” which, until an employee exposure assessment is completed, assumes a certain level of employee exposure and triggers certain required protective measures (*see subsection (b) for definitions*), and revising the listing of specified tasks (*subsection (d)(2)*);
- (4) lowering the PEL for lead, calculated as an 8-hour TWA, from $50 \mu\text{g}/\text{m}^3$ to $10 \mu\text{g}/\text{m}^3$ (*subsection (c)(1)*);
- (5) establishing general hygiene requirements when employees have occupational exposure to lead, rather than exposure to lead above the PEL (*subsection (i)(1)(A)*);
- (6) removing the requirement to provide zinc protoporphyrin (ZPP) testing on a routine basis when blood lead testing is provided (*subsection (j)(2)(A)*);
- (7) requiring medical examinations (*subsection (j)(1)(B)(2)*), regulated areas (*subsection (i)(6)(A)*), eating areas (*subsection (i)(4)(A)*) and a lead training program (*subsection (i)(1)(B)(3)*), as interim protection based on performing trigger tasks, and additional protections when employees conduct level 3 trigger tasks (*subsections (i)(3)(A) and (j)(2)(A)(5)*);
- (8) reducing the duration of specified work that triggers the requirement to implement medical surveillance for employees (*subsection (j)(1)(B)*);
- (9) increasing the frequency of BLL testing to be provided for employees when their BLL is at or above $10 \mu\text{g}/\text{dl}$, or their airborne exposure is above $500 \mu\text{g}/\text{m}^3$ (*subsection (j)(2)(A)*), and

- requiring a response plan when an employee's BLL is at or above 10 µg/dl (*subsection (j)(2)(E)(1)*);
- (10) lowering the BLL at which specified employees must be offered medical examinations and consultations at least annually from 40 µg/dl to 20 µg/dl (*subsection (j)(3)(A)(1)*);
- (11) requiring the employer to ensure that employees receive specified health information from the ordering or examining physician following a blood lead test (*subsection (j)(2)(D)*) or medical examination (*subsection (j)(3)(E)*);
- (12) lowering the criteria for temporary removal from work with lead due to elevated BLLs, known as medical removal protection (MRP), from 50 µg/dl to one BLL at or above 30 µg/dl, or effective one year after the effective date, the last two BLLs are at or above 20 µg/dl or the average of all BLLs in the last 6 months is at or above 20 µg/dl (*subsection (k)(1)(A)*);
- (13) expanding the type of work that employees on MRP must be removed from, to include performing trigger tasks, and altering and disturbing lead-containing material (*subsection (k)(1)(A)*), in addition to existing requirements;
- (14) lowering the BLL that employees must achieve before returning from MRP to work involving lead from 40 µg/dl to 15 µg/dl (*subsection (k)(1)(C)1.a.*); and
- (15) expanding the contents of required training (*subsection (l)(2)*).

These proposals would also make changes to the section's appendices to reflect the changes proposed for section 1532.1 and to provide current information about lead.

The proposed amendments would revise the requirements of section 5155. The revisions of existing requirements would:

- (1) lower the PEL for lead (metallic) and inorganic compounds, dust and fume, as Pb (lead), calculated as an 8-hour TWA, from 0.05 milligrams of lead per cubic meter of air (0.05 mg/m³) to 0.01 mg/m³ (*Table AC-1*); and
- (2) lower the PEL for lead chromate, as Pb (lead), from 0.02 mg/m³ to 0.01 mg/m³ (*Table AC-1*).

The proposed amendments would revise the requirements of section 5198. Principal revisions of existing requirements would include:

- (1) lowering the action level, which triggers certain requirements, from 30 µg/m³ as an 8-hour TWA to 2 µg/m³ as an 8-hour TWA (*subsection (b)*);
- (2) adding and defining the terms "altering or disturbing," "blood lead level," and "high-efficiency particulate air (HEPA) filter" (*subsection (b)*);
- (3) adding and defining the term "presumed hazardous lead work (PHLW)," which triggers certain required protective measures (*see subsection (b) for definition*);
- (4) lowering the PEL for lead, calculated as an 8-hour TWA, from 50 µg/m³ to 10 µg/m³ (*subsection (c)(1)*);
- (5) requiring respiratory protection, protective clothing and equipment, medical surveillance, training, and warning signs for lead, when employees perform PHLW (*subsection (d)(2)*);
- (6) establishing a separate engineering control air limit (SECAL) for particular processes in the manufacturing of lead acid batteries (*subsection (e)(1)(B)*);
- (7) establishing general hygiene requirements when employees have occupational exposure to lead, rather than exposure to lead above the PEL (*subsection (i)(1)(A)*);

- (8) reducing the duration of specified work that triggers the requirement to implement medical surveillance for employees (*subsection (j)(1)(A)*);
- (9) removing the requirement to provide ZPP testing on a routine basis when blood lead testing is provided (*subsection (j)(2)(A)*);
- (10) increasing the frequency of BLL testing for employees when their BLL is at or above 10 µg/dl (*subsection (j)(2)(A)*), and requiring a response plan when an employee's BLL is at or above 10 µg/dl (*subsection (j)(2)(E)*);
- (11) lowering the BLL at which specified employees must be offered medical examinations and consultations at least annually from 40 µg/dl to 20 µg/dl (*subsection (j)(3)(A)1.*);
- (12) requiring the employer to ensure that employees receive specified health information from the ordering or examining physician following a blood lead test (*subsection (j)(2)(D)*) or medical examination (*subsection (j)(5)*);
- (13) lowering the criteria for temporary removal from work with lead due to elevated BLLs, known as MRP, from an average BLL of 50 µg/dl to one BLL at or above 30 µg/dl, or effective one year after the effective date, the last two BLLs are at or above 20 µg/dl or the average of all BLLs in the last 6 months are at or above 20 µg/dl (*subsection (k)(1)*);
- (14) expanding the type of work that employees on MRP must be removed from, to include altering or disturbing lead-containing material and torch cutting any scrap metal (*subsection (k)(1)*), in addition to existing requirements;
- (15) lowering the BLL that employees must achieve before returning from MRP to work involving lead from 40 µg/dl to 15 µg/dl (*subsection (k)(3)(A)1.*); and
- (16) expanding the contents of required training (*subsection (l)(1)(E)*).

These proposals would also make changes to the section's appendices, to reflect the changes proposed for section 5198, and to provide current information about lead.

Relationship to Federal OSHA Regulations

This proposed rulemaking action differs from existing federal regulations in a number of ways. The existing regulations for lead are based on federal regulations for Lead in Construction [Code of Federal Regulations (CFR) title 29 section (§) 1926.62] and Lead in General Industry [29 CFR §1910.1025]. Existing federal regulations establish a PEL for lead of 50 µg/m³, as an 8-hour TWA concentration [29 CFR §1926.62(c)(1); 29 CFR §1910.1025(c)(1)]. In addition, federal lead regulations include an action level for lead of 30 µg/m³ [29 CFR §1926.62(b); 29 CFR §1910.1025(b)]; hygiene requirements for employees exposed above the PEL [29 CFR §1926.62(i)(2)(i)]; 29 CFR §1910.1025(i)(1)]; medical surveillance requirements based on employee exposure at or above the action level for more than 30 days per year [29 CFR §1926.62(j)(1)(ii); 29 CFR §1910.1025(j)(1)(i)]; and a medical removal level of 50 µg/dl of whole blood [29 CFR §1926.62(k)(1)(i)]; or 60 µg/dl or an average of 50 µg/dl [29 CFR §1910.1025(k)(1)(i)(A)]. As discussed above, the proposed amendments would increase the use of protective measures such as substitution, engineering controls and administrative controls, with the goal of providing greater protection for employees from the hazards of lead exposure. Thus, the proposed amendments would create requirements that are more protective than existing federal regulations.

The proposed revisions to requirements for the provision of ZPP testing in sections 1532.1 and 5198 also differ from existing federal requirements. Federal regulations require employers to provide ZPP testing on a routine basis when blood lead testing is provided [29 CFR §1926.62(j)(2)(i); 29 CFR §1910.1025(j)(2)(i)]. Current recommendations for the medical management of adult lead exposure do not recommend the routine measurement of ZPP because it is an insensitive biomarker of lead exposures in individuals with blood lead concentrations below 25 µg/dl. With these proposals, the ZPP test would no longer be a routine part of medical surveillance. Rather, under these proposals, ZPP testing would be required as part of a medical examination when an employee has a BLL at or above 20 µg/dl. In this way, the ZPP test would be required for employees with BLLs at which the ZPP is sensitive as a biomarker of lead exposures.

The Board evaluated the proposed regulations pursuant to Government Code section 11346.5(a)(3)(D) and has determined that this proposed rulemaking action is not inconsistent or incompatible with existing state regulations including but not limited to lead poisoning prevention regulations in title 17 CCR enforced by the California Department of Public Health. This proposal is part of a system of occupational safety and health regulations. The consistency and compatibility of that system's component regulations is provided by such things as: (1) the requirement of the federal government and the Labor Code to the effect that the State regulations be at least as effective as their federal counterparts, and (2) the requirement that all state occupational safety and health rulemaking be channeled through a single entity (the Board).

Anticipated Benefits

The anticipated benefits of the proposals are a reduction in the number of employees exposed to harmful amounts of lead. This would include exposures to employees in both Construction and General Industry, in a wide variety of occupations and work settings. Employee exposures to lead from both inhalation of airborne lead and ingestion of lead through the oral route of exposure would be reduced. The effect of these revisions would be to lower the risk that employees exposed to lead will develop harmful health effects, including high blood pressure, heart disease, decreased kidney function, reproductive and neurological effects, as well as premature death.

These proposals would generate benefits in the form of avoided costs associated with morbidity (induced illness) and mortality (shortened life expectancy) caused by occupational lead exposure. It is estimated that the monetary benefit of the regulation, due to avoided cases of lead-related illness and premature death, and the costs associated with them, would be \$27.9 million at the end of year 1 of the proposed regulation. This value would increase each year, with annual benefits reaching \$1.3 billion per year at the end of year 45 of the proposed regulation. The monetary value of benefits increases each year because the effects of lead exposure are cumulative. The longer the proposed regulation is in place, the more cases of lead-related illnesses and premature deaths are avoided each year. Benefit categories quantified in the Standardized Regulatory Impact Assessment (SRIA) include all-cause mortality, hypertension, non-fatal heart attack and depression/anxiety. The benefit estimates represent only a fraction of the total potential benefits, as they do not quantify the value of all health benefits that would result from these proposals.

In addition, by lowering workplace exposure to lead, the proposed regulation would also result in reduced “take-home” lead exposure for non-employees, and California society at large. In many cases, unless a lead-exposed employee changes clothes and showers prior to returning home, lead dust is transported into their home. The employee’s family and other household members are then exposed to elevated levels of lead. Reducing levels of lead exposure in the workplace, and increasing hygiene measures, will therefore also reduce lead exposure to susceptible individuals, including infants, children and individuals of childbearing age. The negative health effects of lead on infants and children are well known, and include developmental delay, neurobehavioral disorders and lowered IQ. Avoiding these negative health effects would have a positive result on society as a whole.

The proposed regulation will also have a positive effect on California’s environment. Because the amount of lead used in workplaces is likely to decrease as a result of compliance with the proposed regulation, the amount of lead emitted into the environment is also likely to decrease. A reduction of lead in the environment would also have a positive effect on California’s residents, as their exposure to lead and its harmful effects would be reduced.

DISCLOSURES REGARDING THE PROPOSED ACTION

Mandate on Local Agencies or School Districts: None.

Cost or Savings to any State Agency: There are an estimated 41,038 state government employees occupationally exposed to lead. Of these, an estimated 40,928 work in General Industry, and 110 work in Construction. The proposed regulations are expected to cost the California government approximately \$2.9 million in the initial year and \$2.7 million per year in subsequent years. Eighty-six percent (86%) of this cost is associated with state law enforcement agencies.

The proposal reduces occupational exposure to lead and the associated health effects of this exposure, generating estimated annual benefits ranging from \$5.4 million in the first year to \$244.3 million by year 45, due to avoided lead-related illnesses and premature deaths in employees of state agencies. In addition, as the number of lead-related health conditions suffered by employees is reduced, state agencies should experience a decrease in fiscal losses due to work absence, staff replacement, workers’ compensation costs and other legal costs.

Cal/OSHA will enforce the proposed regulations and has contemplated the associated cost of enforcement. Cal/OSHA estimates that it may need to conduct approximately 120 additional inspections per year. Although this scenario is highly unlikely, to conduct 120 additional inspections, Cal/OSHA would need an additional four industrial hygienists, at a total cost of \$789,000 in the first year, and \$730,000 per year on an ongoing basis.

Cost to any Local Agency or School District which must be Reimbursed in Accordance with Government Code sections 17500 through 17630: None.

Other Nondiscretionary Cost or Savings Imposed on Local Agencies: There are an estimated 72,439 local government employees exposed to lead. Of these, an estimated 68,341 work in General Industry, and 4,098 work in Construction. The proposed regulations will cost local governments an estimated \$16.5 million in the initial year and \$9.7 million per year in subsequent years. Just under half of this cost is associated with local police departments coming into compliance with more stringent occupational lead standards. Utilities and construction employees employed by local governments account for most of the rest of the additional cost.

The proposal reduces occupational exposure to lead and the associated health effects of this exposure, generating estimated annual benefits ranging from \$9.5 million in the first year to \$426.5 million by year 45, due to avoided lead-related illnesses and premature deaths in employees of local agencies. In addition, as the number of lead-related health conditions suffered by employees is reduced, local agencies should experience a decrease in fiscal losses due to work absence, staff replacement, workers' compensation costs and possibly other legal costs.

Cost or Savings in Federal Funding to the State: The Board is not aware of any cost or savings in Federal Funding to the State.

Cost Impacts on a Representative Private Person or Business: The Board is not aware of any cost impacts that a representative private person would necessarily incur in reasonable compliance with the proposed action. The Board is aware that there are cost impacts that a representative business may incur in reasonable compliance with the proposed action. The estimated compliance cost for a typical business is \$10,647 in year 1 of the regulations, and \$8,514 per year in subsequent years. Compliance costs include costs for air monitoring, engineering controls, respiratory protection, personal protective equipment, basic hygiene, advanced hygiene, medical surveillance, MRP and training.

Statewide Adverse Economic Impact Directly Affecting Businesses and Individuals: Including the Ability of California Businesses to Compete: The Board has made an initial determination that this proposal will not result in a significant, statewide adverse economic impact directly affecting businesses/individuals, including the ability of California businesses to compete with businesses in other states.

This proposal is expected to reduce serious illnesses and fatalities by reducing lead exposure to employees. The annual cost of compliance with the proposal for California employers is expected to be exceeded by the monetized annual benefit of the proposal by year seven of the proposed action.

Many of the businesses in the sectors that are most affected by the proposed regulations (for example, construction, firing ranges, security firms and scrap metal recycling) are not particularly susceptible to competition from outside of the state, since their work must be performed in California. All firms engaging in these activities are therefore subject to the proposed regulations. Berkeley Economic Advising and Research, LLC (BEAR) concluded in its *Standardized Regulatory Impact Assessment: Revisions to Occupational Lead Standards* that

California firms are not expected to be at a competitive disadvantage due to the new regulations (BEAR, 2020).

Significant Effect on Housing Costs: None.

SMALL BUSINESS DETERMINATION

The Board has determined that the proposed amendments may affect small businesses.

California Government Code section 11346.3 defines small businesses as businesses that are independently owned and operated, not dominant in their field of operation and have fewer than 100 employees.

Using data from the California Employment Development Department (EDD) Labor Market Information (LMI) (EDD, 2018), it is estimated that 58% of employees in California work for small businesses. Therefore, it is estimated that approximately 58% of all private sector compliance costs will be incurred by small businesses in California. The cost of compliance for a small business, on average, is expected to be approximately \$5,989 in the first year and \$4,837 per year in subsequent years.

RESULTS OF THE STANDARDIZED REGULATORY IMPACT ASSESSMENT (SRIA)

Introduction

The Standardized Regulatory Impact Assessment (SRIA) for revisions to California Code of Regulations title 8 occupational lead standards (sections 1532.1, 5155 and 5198) was conducted by David Roland-Holst, Samuel Evans, and Samuel Neal from Berkeley Economic Advising and Research. The SRIA is in compliance with Department of Finance regulations, was completed in February 2019 and revised August 2020.

The SRIA was undertaken to update the existing title 8 regulations, which are based on outdated lead toxicity, medical and epidemiological data that is over 40 years old. More recent evidence demonstrates that the existing regulations do not protect employees fully from the harmful effects of lead and lead poisoning. The proposed regulations are designed to update the regulations to be more consistent with existing scientific knowledge and better protect employees from serious harm.

The creation or elimination of jobs in the state.

There is no net anticipated creation or elimination of jobs in California, as compliance costs may reduce jobs in some industries while simultaneously stimulating employment in smaller but more labor-intensive sectors providing compliance equipment and services in the state. The macroeconomic impacts of the regulatory revisions are expected to be quite small, and there is no indication that the regulations will significantly affect the number of jobs in California.

The creation of new businesses or the elimination of existing businesses in the state.

There is no net anticipated creation or elimination of businesses in California. A very small number of businesses may decide to cease operations rather than comply with the new requirements. However, new demand for labor and materials created by each compliance action creates opportunities for new businesses, which will likely increase new businesses in California. The macroeconomic impacts of the regulatory revisions are expected to be quite small, and there is no indication that the regulations will significantly affect the creation or elimination of new businesses in California.

The competitive advantages or disadvantages for businesses currently doing business in the state.

Many of the businesses in the sectors that are most affected by the proposed regulations (for example, construction, firing ranges, security firms and scrap metal recycling) are not particularly susceptible to competition from outside of the state, since their work must be performed in California. All firms engaging in these activities are therefore subject to the proposed regulations. Therefore, California firms are not expected to be at a competitive disadvantage due to the new regulations. The macroeconomic impacts of the regulatory revisions are expected to be quite small, and there is no indication that the regulations will significantly create advantages or disadvantages for businesses in California.

The increase or decrease of investment in the state.

Cal/OSHA held six advisory committee meetings to determine what amendments should be proposed for sections 1532.1 and 5198. The meetings were open to the public. Representatives from industry, labor, occupational medicine, advocacy groups and government agencies participated. All input was considered, and the current proposed regulations reflect a balanced, enforceable and prevention-focused approach to reducing risks related to the presence of lead in workplaces in California. The macroeconomic impacts of the regulatory revisions are expected to be quite small, and there is no indication that the regulations will significantly affect investment in California.

The incentives for innovation in products, materials, or processes.

In nearly all sectors considered in this analysis, the simplifying assumption is made that businesses would comply with the proposed regulations by protecting workers from lead in the workplace. This assumption implies no major changes to the production processes in each sector. However, an alternative compliance option for some sectors would be to find alternative processes that either do not use lead-containing materials, or that prevent the release of lead into the air. For example, law enforcement could plausibly switch over to lead-safer bullets, which prevent employee exposure to airborne lead, rather than adopt the prescribed protective measures. In industries where this is feasible, this could provide some incentive to innovate as new lead-free methods of production would be sought out and developed. For many occupations, such as employees engaged in paint removal, working in a

lead-free space is unlikely. In such sectors, considerable incentives for innovation from the proposed regulation are not expected.

The new demand for labor and materials created by each compliance action could create an opportunity for new businesses to develop in the state. While some of the new demand will be for products that are imported from outside the state, other requirements present an opportunity for innovation and new businesses, or the expansion of existing business enterprises, in California. For example, more stringent air monitoring requirements will increase demand for industrial hygienists. The advanced hygiene requirements will increase demand for portable showers and washrooms. The engineering control requirements will increase demand for ventilation systems and their installation. These services are likely to be met by an increase in business activity within the state.

The benefits of the regulations, including, but not limited to, benefits to the health, safety, and welfare of California residents, worker safety, environment and quality of life, and any other benefits identified by the agency.

These proposals would limit workplace exposure to lead and generate benefits in the form of avoided costs associated with morbidity (induced illness) and mortality (shortened life expectancy) caused by occupational lead exposure.

The current occupational lead regulations allow for acute and chronic harmful effects to employees from occupational lead exposure and are dangerously insufficient. The proposed changes will mitigate most of the harmful inadequacy of the existing regulations and better protect employees from increased mortality, impaired kidney function, high blood pressure, cardiovascular disease, nervous system and neurobehavioral effects, cognitive dysfunction later in life and cognitive effects associated with prenatal exposure.

It is estimated the monetary benefit of the regulation, due to avoided cases of lead-related illness and premature death, and the costs associated with them, would be \$27.9 million at the end of year 1 of the proposed regulation. This value would increase each year, with annual benefits reaching \$1.3 billion per year at the end of year 45 of the proposed regulation. The monetary value of benefits increases each year because the effects of lead exposure are cumulative. The longer the proposed regulation is in place, the more cases of lead-related illness and premature deaths are avoided each year. Benefit categories quantified in the SRIA include all-cause mortality, hypertension, non-fatal heart attack and depression/anxiety. The benefit estimates represent only a fraction of the total potential benefits, as they do not quantify the value of all health benefits that would result from these proposals.

In addition, by lowering workplace exposure to lead, the proposed regulation would also result in reduced “take home” lead exposure for non-employees and California society at large. In many cases, unless a lead-exposed employee changes clothes and showers prior to returning home, lead dust is transported into their home. The employee’s family and other household members are then exposed to elevated levels of lead. Reducing levels of lead exposure in the workplace, and increasing hygiene measures, would therefore also reduce lead exposure to

susceptible individuals, including infants, children and women of childbearing age. The negative health effects of lead on infants and children are well known, and include developmental delay, neurobehavioral disorders and lowered IQ. Avoiding these negative health effects would have a positive result on society as a whole.

These proposals will go far to protect the health of employees and their families in California, as well as the health of its residents.

Department of Finance (DOF) Comments and Department of Industrial Relations (DIR) Responses

DOF: *First, the SRIA must incorporate the costs of medical removal, consistent with data on blood lead levels. The SRIA assumes that no construction workers have a blood lead level above 30 µg/dl, but a California Department of Public Health report based on laboratory blood test results from California workers showed that in 2012, 13 out of a sample of 2000 construction employees demonstrated blood lead levels above 30 µg/dl. This is not surprising given that construction is one of the most lead-exposed industries. With around 930,000 construction workers projected in 2020, similar rates would imply more than 6,000 medical removals. Assuming those workers are not laid off (if laid off, they would lose wages), construction firms would have to absorb the lower productivity costs of assigning them to other tasks. An upper bound for those costs would be the wages of the construction worker through the medical removal period – at the average industry wage in 2020, a six-month removal would be around \$40,000.*

DIR: The 2012 data showing 13 workers out of 2,000 tested with blood lead levels exceeding 30 µg/dl is not representative of the blood lead levels among all 930,000 construction workers in California. The sample of 2,000 workers in the referenced analysis was not a sample of the general construction workforce, but taken from workers known to have significant occupational lead exposures. The sample is not representative of the general construction workforce and as a result this analysis cannot be extrapolated to the general construction workforce. The vast majority of the 930,000 workers have no lead exposure whatsoever. The SRIA calculated that 84,868 construction workers have some lead exposure. The rate of 13 workers per 2,000 with blood lead levels over 30 µg/dl applied to the 84,868 construction workers with lead exposure would result in about 550 medical removals; not 6,000 medical removals.

The DOF wage rate assumption applied to these 550 medical removals would result in an additional compliance cost of \$24.2 million in year 1 of the proposed regulations. However, as DOF noted, this is likely to be an upper bound of the cost estimate. If we assume that these workers can be reassigned to clerical tasks while on work removal, at an average wage of \$18/hour (or \$22,000 over six months), the total cost attributable to medical removal would be \$12.1 million in year 1 of the proposed regulation.

DOF: *Given that the medical removal threshold in the second year is lowered to 20 µg/dl, blood lead levels decline slowly, and given current data, many construction workers are expected to be subject to medical removal protection in the second year. The additional*

medical removals would also yield larger health benefits for the workers.

DIR: We stand behind our assertion that no construction employees are expected to be subject to medical removal protection in the second year of the standard. Based on a blood lead model developed by the California Environmental Protection Agency-Office of Environmental Health Hazard Assessment (OEHHA, 2013), employees with a BLL of 30 µg/dl who were exposed to high levels of lead for 40 years, on average would see their BLL reduced to less than 15 µg/dl in 210 days when removed from exposure to lead. Employees with a BLL of 20-30 µg/dl at the start of year 1 of the revised standard would see their BLL drop to below 20 µg/dl by the start of year 2 of the more protective revised lead standard.

DOF: *The SRIA should include the fiscal costs of enforcing medical removals and employee protections. Since most affected entities are small businesses, and given the large potential compliance costs incurred by employers, there are incentives to ignore testing results or lay off affected workers. Small specialized businesses are particularly unlikely to have other tasks or positions available within the firm, and could have to send employees home with pay to comply with the regulations. To protect against this, additional enforcement efforts are likely to be required, and these costs must be included in the SRIA and fiscal estimates in the STD. 399.*

DIR: Cal/OSHA estimates that it may need to conduct about 120 inspections per year if, after the proposed regulation becomes effective, all of the following occur:

1. Cal/OSHA is required to or otherwise decides to investigate every case where an employee's blood lead level exceeds 20 µg/dl;
2. One hundred percent of covered employers fail to comply with the proposed regulation; and
3. Lead exposures to employees do not decrease.

Although this scenario is highly unlikely, to conduct 120 additional inspections, Cal/OSHA would need an additional four industrial hygienists at a cost of \$789,000 in the first year and \$730,000 per year on an ongoing basis.

DOF: *Since the baseline is not a valid alternative, the SRIA must add and analyze a second alternative.*

In response to DOF's comment that the status quo is not a valid regulatory alternative, DIR developed a new less stringent regulatory alternative for the analysis. The new less stringent regulatory alternative would reduce the blood lead testing requirements for construction employees exposed at >500 µg/m³ from a BLL test every month, to a BLL test every two months after the first year of the regulation. Medical surveillance is the main source of costs of the proposed regulation, and thus reducing the testing interval would decrease compliance costs substantially for construction (as shown below). Please see the Information on the summary of compliance costs for the less stringent regulatory alternative is listed below:

Air Monitoring (Year 2+)

Proposed Regulation = \$2,175,011

Less Stringent Regulatory Alternative = \$2,175,011

Engineering Controls (Year 2+)

Proposed Regulation = \$6,666,374

Less Stringent Regulatory Alternative = \$6,666,374

Respiratory Protection (Year 2+)

Proposed Regulation = \$3,240,515

Less Stringent Regulatory Alternative = \$3,240,515

Personal Protective Equipment (Year 2+)

Proposed Regulation = \$1,243,819

Less Stringent Regulatory Alternative = \$1,243,819

Hygiene (lunchroom, showers, change rooms) (Year 2+)

Proposed Regulation = \$6,801,272

Less Stringent Regulatory Alternative = \$6,801,272

Hygiene – basic (Year 2+)

Proposed Regulation = \$12,151,886

Less Stringent Regulatory Alternative = \$12,151,886

Medical Surveillance (Year 2+)

Proposed Regulation = \$47,680,091

Less Stringent Regulatory Alternative = \$24,639,158

Medical Removal Program (Year 2+)

Proposed Regulation = \$0

Less Stringent Regulatory Alternative = \$0

Training – Comprehensive (Year 2+)

Proposed Regulation = \$4,431,073

Less Stringent Regulatory Alternative = \$4,431,073

Total Compliance Cost - Construction (1532.1) (Year 2+)

Proposed Regulation = \$84,390,041

Less Stringent Regulatory Alternative = \$61,349,108

Cal/OSHA estimates that approximately 15,400 (18%) lead-exposed construction employees in California are exposed above 500 $\mu\text{g}/\text{m}^3$. They are predominantly engaged in the renovation of existing steel structures that are coated with lead-based paint (abrasive blasting, welding, torch cutting). In this group, exposures can be much higher than 500 $\mu\text{g}/\text{m}^3$. The original standard is based on data showing exposures to this group of employees can exceed 30,000 $\mu\text{g}/\text{m}^3$ during abrasive blasting activities. In addition, high airborne exposures mean that

surface contamination is significant, and therefore the potential for lead exposure due to inadvertent ingestion is also high.

For further details on this alternative, please see the explanation below in the part entitled “CONSIDERATION OF ALTERNATIVES - Alternative 2: Less stringent regulatory alternative.”

CONSIDERATION OF ALTERNATIVES

Alternative 1: More stringent regulatory alternative.

One alternative considered was more stringent than the proposal. In this alternative, the PEL would be set at 2 $\mu\text{g}/\text{m}^3$, rather than the proposed level of 10 $\mu\text{g}/\text{m}^3$. This change would both increase the compliance costs for regulated entities and potentially increase employee benefits by reducing even low-level occupational exposure to lead.

Under the more stringent regulatory alternative, with a lower PEL, the total compliance costs for construction employers would be higher than the compliance costs under the proposed regulation. This is due to the fact that Cal/OSHA’s exposure modeling indicates that most employees in construction have exposure levels less than 10 $\mu\text{g}/\text{m}^3$ lead, so a lower PEL would capture many additional employees and therefore increase costs. Costs would increase from \$104 million (year 1) and \$84 million (year 2+) under the proposed regulation to \$160 million (year 1) and \$126 million (year 2+) under the more stringent alternative with the lower PEL. In general industry, the compliance costs would nearly double, from \$144 million (year 1) and \$111 million (year 2+) under the proposed regulation, to \$281 million (year 1) and \$203 million (year 2+) with the lower PEL. This is because most general industry employees are exposed to less than 10 $\mu\text{g}/\text{m}^3$ lead, so a lower PEL in the more stringent alternative would capture many additional employees and therefore increase costs. Significantly, for their thousands of law enforcement employees, employers would be required to adopt more stringent control requirements than would be required under the proposed regulatory changes.

Reducing the permissible exposure limit to 2 $\mu\text{g}/\text{m}^3$ would generate all of the same benefits as reducing the permissible exposure limit to 10 $\mu\text{g}/\text{m}^3$, as well as further benefits from the additional reduction below 10 $\mu\text{g}/\text{m}^3$. The benefits of reduction below 10 $\mu\text{g}/\text{m}^3$ depend on the health risks of low-level lead exposure and these remain unclear. While exposure to small amounts of lead was previously thought to present minimal health risk, recent evidence suggests that even low-level environmental lead exposure may increase the risk of cardiovascular disease mortality. While this new finding suggests substantial benefits would result from the additional reduction in exposure, most studies do not attempt to quantify the health benefits from reductions in exposure below these levels, so there is insufficient evidence to quantify the magnitude of these benefits. In addition, compliance costs would increase significantly in both construction and general industry. For these reasons, adopting a PEL of 2 $\mu\text{g}/\text{m}^3$ is rejected.

Alternative 2: Less stringent regulatory alternative.

A second alternative considered was less stringent than the proposal. In this alternative, construction employers would be required to provide employees exposed at $> 500 \mu\text{g}/\text{m}^3$ with a BLL test every two months, after the first year of the regulation, rather than the proposed requirement of a BLL test every month. Medical surveillance is the main source of costs of the proposed regulation, thus reducing the testing interval would decrease compliance costs for construction employers.

Under the less stringent regulatory alternative, with BLL tests required to be provided to construction employees exposed $>500 \mu\text{g}/\text{m}^3$ every two months, compliance costs for construction employers would be reduced, for years 2+ of the regulation, from \$48 million under the proposal to \$25 million under this alternative. This is based on Cal/OSHA's estimate that approximately 15,400 lead-exposed construction employees in California are exposed at levels above $500 \mu\text{g}/\text{m}^3$.

While the less stringent regulatory alternative would potentially save employers in terms of lost employee time and testing expenditures, this alternative would result in less effective control of employees' exposure to lead. The proposed standards are aimed at maintaining all employees' BLLs below $10 \mu\text{g}/\text{dl}$. In this group of employees, exposures can be much higher than $500 \mu\text{g}/\text{m}^3$. The original standard is based on data showing exposures to this group of employees can exceed $30,000 \mu\text{g}/\text{m}^3$ during abrasive blasting activities. In addition, high airborne exposures mean that surface contamination is significant, and therefore the potential for lead exposure due to inadvertent ingestion is also high.

This alternative would likely result in undetected BLL rises among the employees most highly exposed to lead. As such, it would be significantly less protective than the proposal. Undetected increases in employees' BLLs would likely result in additional cases of adverse health outcomes, including hypertension, cardiovascular disease, nervous system and neurobehavioral effects, and impaired kidney function. As a result, the benefits generated in the form of avoided costs associated with these diseases would be reduced. While it is not possible to quantify the magnitude of additional cases of adverse health outcomes and the resulting reduction in monetary benefits, it could be substantial.

In addition, projected savings would be reduced, if not eliminated, if more employees were placed on costly MRP as a result of less frequent blood testing. The current proposal mandates MRP at a single BLL of $30 \mu\text{g}/\text{dl}$ (or at multiple BLLs over $20 \mu\text{g}/\text{dl}$). Keeping employees below these BLLs in high exposure trades will require strict controls, diligently adhered to, and carefully monitored. Less frequent BLL testing would mean it would be less likely that a rapidly rising BLL would be detected before the MRP criteria are met. MRP is expensive; it requires the removal of an employee from lead work, maintenance of salary and benefits, and significant medical costs. It is quite likely that any savings gained from less frequent BLL testing would be lost to increased MRP costs.

The savings of this alternative are questionable, and the costs in terms of additional adverse health effects are likely significant. For these reasons, adopting this less stringent alternative is rejected.

In accordance with Government Code section 11346.5(a)(13), the Board must determine that no reasonable alternative it considered to the regulation or that has otherwise been identified and brought to its attention would either be more effective in carrying out the purpose for which the action is proposed, or would be as effective and less burdensome to affected private persons than the proposed action, or would be more cost-effective to affected private persons and equally effective in implementing the statutory policy or other provision of law than the proposal described in this Notice.

The Board invites interested persons to present statements or arguments with respect to alternatives to the proposed regulation at the scheduled public hearing or during the written comment period.

CONTACT PERSONS

Inquiries regarding this proposed regulatory action may be directed to Christina Shupe (Executive Officer) or the back-up contact person, Amalia Neidhardt (Principal Safety Engineer) at the Occupational Safety and Health Standards Board, 2520 Venture Oaks Way, Suite 350, Sacramento, CA 95833; (916) 274-5721.

AVAILABILITY OF STATEMENT OF REASONS, TEXT OF THE PROPOSED REGULATIONS AND RULEMAKING FILE

The Board will have the entire rulemaking file available for inspection and copying throughout the rulemaking process BY APPOINTMENT Monday through Friday, from 8:00 a.m. to 4:30 p.m., at the Board's office at 2520 Venture Oaks Way, Suite 350, Sacramento, California 95833. Appointments can be scheduled via email at oshsb@dir.ca.gov or by calling (916) 274-5721. As of the date this Notice of Proposed Action is published in the Notice Register, the rulemaking file consists of this Notice, the proposed text of the regulations, the initial statement of reasons for this proposed action and supporting documents. Copies may be obtained by contacting Ms. Shupe or Ms. Neidhardt at the address or telephone number listed above.

AVAILABILITY OF CHANGED OR MODIFIED TEXT

After holding the hearing and considering all timely and relevant comments received, the Board may adopt the proposed regulations substantially as described in this Notice. If the Board makes modifications which are sufficiently related to the originally proposed text, it will make the modified text (with the changes clearly indicated) available to the public at least 15 days before the Board adopts the regulations as revised. Please request copies of any modified regulations by contacting Ms. Shupe or Ms. Neidhardt at the address or telephone

number listed above. The Board will accept written comments on the modified regulations for at least 15 days after the date on which they are made available.

AVAILABILITY OF THE FINAL STATEMENT OF REASONS

Upon its completion, copies of the Final Statement of Reasons may be obtained by contacting Ms. Shupe or Ms. Neidhardt at the address or telephone number listed above or via the internet.

AVAILABILITY OF DOCUMENTS ON THE INTERNET

The Board will have rulemaking documents available for inspection throughout the rulemaking process on its web site. Copies of the text of the regulations in an underline/strikeout format, the Notice of Proposed action and the Initial Statement of Reasons can be accessed through the Board's website at <https://www.dir.ca.gov/oshsb/proposedregulations.html>.