

OCCUPATIONAL SAFETY AND HEALTH STANDARDS BOARD

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**INITIAL STATEMENT OF REASONS****CALIFORNIA CODE OF REGULATIONS****TITLE 8: New Section 3396 of the General Industry Safety Orders****Heat Illness Prevention in Indoor Places of Employment****I. GENERAL PURPOSE OF PROPOSED REGULATION**

Pursuant to California Labor Code (LC) section 142.3, the Occupational Safety and Health Standards Board (Board) may adopt, amend, or repeal occupational safety and health standards or orders. LC section 142.3 permits the Board to prescribe suitable protective equipment and control or technological procedures to be used in connection with occupational hazards and to provide for monitoring or measuring employee exposure for the protection of employees.

This rulemaking is in response to LC section 6720 (enacted in 2016 by Senate Bill 1167), which instructed the Division of Occupational Safety and Health (the Division or Cal/OSHA) to propose to the Board a standard that minimizes heat-related illness and injury among workers working in indoor places of employment. LC section 6720 directed that the standard be based on environmental temperatures, work activity levels, and other factors. In developing the standard, Cal/OSHA took into consideration heat stress and heat strain guidelines in the 2016 Threshold Limit Values and Biological Exposure Indices developed by the American Conference of Governmental Industrial Hygienists. LC section 6720 does not prohibit Cal/OSHA from proposing, or the Board from adopting, a standard that limits the application of high heat provisions to certain industry sectors.

From February 2017 through February 2018, Cal/OSHA held three advisory committee meetings to develop a proposed regulation for minimizing heat-related illness among workers in indoor places of employment. These meetings were open to the public. Representatives from industry, labor, health and safety experts, advocacy groups, and government agencies participated and provided input. In addition, Cal/OSHA presented multiple discussion drafts, provided opportunity for stakeholder comments and solicited alternatives to the proposed regulation. Cal/OSHA heard in particular from many stakeholders who work in non-air-conditioned environments such as warehouses, shipping containers, commercial kitchens, aircraft cabins, and canning and food processing lines about the real-world impact that heat exposure has on them. Workers from these indoor environments shared experiences of becoming sick, feeling

dizzy, and passing out due to exposure to heat.¹ Workers also told of instances where they were sent home sick by the employer without being provided medical evaluation or suffered retaliation for reporting an illness.

II. PROBLEM INTENDED TO ADDRESS

In August 2005, the Board adopted an emergency regulation to prevent heat illness in outdoor places of employment (title 8 California Code of Regulations (CCR) section 3395) and, in June 2006, a permanent regulation. However, in the Final Statement of Reasons (FSOR) and in response to stakeholders' concerns, the Board recognized that heat illness is not limited to outdoor work environments and committed to reconvening an advisory committee to address the risk of heat illness in indoor work environments.² In July 2007, Cal/OSHA announced that it would not be seeking an indoor heat illness standard, citing a small number of cases of indoor heat investigated since 2006.³

Since then, experience gained through the enforcement of section 3395, Heat Illness Prevention in Outdoor Places of Employment, and other regulations continues to demonstrate that heat-related injuries and illnesses occur in indoor work environments despite the existence of current regulations. Since existing regulations do not adequately protect against heat illness in indoor places of employment, a new regulation is needed. Many employees in indoor settings such as factories, kitchens, warehouses, and foundries work in hot environments without air conditioning and are often unable to take advantage of hot weather cease-work policies that can apply to their counterparts working in outdoor places of employment.⁴ A new regulation will provide better protections against heat illness for workers laboring in indoor places of employment by mandating employers to provide access to drinking water and cool-down areas, to closely observe employees during acclimatization, to train employees, and to provide timely emergency aid.

To gauge the number of heat-related illnesses associated with indoor places of employment, the Department of Industrial Relations (DIR) and Cal/OSHA reviewed workers' compensation

¹ Cal/OSHA Heat Illness Prevention in Indoor Places of Employment Advisory Committee Meetings. Meeting minutes and including list of attendees. February 28, 2017 (<https://www.dir.ca.gov/dosh/doshreg/Heat-Illness-Prevention-Indoors/Minutes.2017-02-28.pdf>), May 25, 2017 (<https://www.dir.ca.gov/dosh/doshreg/Heat-Illness-Prevention-Indoors/Minutes-2017-05-25.pdf>), and February 8, 2018 (<https://www.dir.ca.gov/dosh/doshreg/Heat-Illness-Prevention-Indoors/Minutes-2018-02-08.pdf>)

² Heat Illness Prevention Final Statement of Reasons, Title 8 Section 3395 of the General Industry Safety Orders, page 6 of 67, Response to Comment #5. Permanent standard effective July 27, 2006.

³ Senate Bill (SB) 1167 Employment safety: indoor workers: heat regulations. Bill Analysis, June 20, 2016 - Assembly Labor and Employment. https://leginfo.legislature.ca.gov/faces/billAnalysisClient.xhtml?bill_id=201520160SB1167

⁴ Hansen A., Pisaniello D, Varghese B, et al. (2018). What Can We Learn about Workplace Heat Stress Management from a Safety Regulator Complaints Database? International Journal of Environmental Research and Public Health, March 6, 2018, 15(3), 459. <https://doi.org/10.3390/ijerph15030459>

heat-related illness data for the years 2010 through 2018. The analysis included heat-related illnesses of heat prostration, heat stroke, heat exhaustion, heat syncope and heat related fatalities extracted through the use of a list of North American Industry Classification System (NAICS) codes from industries commonly associated with indoor work environments^{5,6} and NAICS codes from indoor heat complaints filed with Cal/OSHA. The data excluded heat-related incidents associated with outdoor places of employment by removing heat related cases containing words in their injury-description-text-field commonly associated with outdoor operations (e.g. trench, excavation, harvesting, outdoor, outside, under the sun, etc.). The resulting numbers showed that there was a significant increase in the number of indoor heat-related injury claims reported, from 139 in 2010 to 211 in 2018, and a total of 1,664 indoor heat cases for years 2010 through 2018.⁷

In addition to Cal/OSHA's experience, the occurrence of indoor heat-related illnesses is further supported by studies that evaluated occupational heat-related illnesses in general or in outdoor workers that demonstrated that occurrences of heat-related illnesses are not restricted to employees working in outdoor places of employment.^{8, 9, 10, 11} Additionally, heat illnesses are very likely to be underreported because of the under recognition of heat-related illness by

⁵ United States Department of Labor, Federal OSHA Occupational Heat Exposure website. Overview: Working in Outdoor and Indoor Heat Environments. Accessed on September 27, 2021.

<https://www.osha.gov/SLTC/heatstress/>

⁶ Jacklitsch B, Williams WJ, Musolin K, et al. Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments: Revised Criteria 2016. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health (NIOSH). February 2016; DHHS (NIOSH) Publication 2016-106. <https://www.cdc.gov/niosh/docs/2016-106/pdfs/2016-106.pdf?id=10.26616/NIOSH PUB2016106>

⁷ Division of Workers' Compensation (DWC) email from Meiton Jin, DWC, to Amalia Neidhardt, Cal/OSHA, October 9, 2019.

⁸ Hansen A, Pisaniello D, Varghese B, et al. What Can We Learn about Workplace Heat Stress Management from a Safety Regulator Complaints Database? *International Journal of Environmental Research and Public Health*, March 6, 2018,15(3), 459. <https://doi.org/10.3390/ijerph15030459>

⁹ Tustin AW, Lamson GE, Jacklitsch BL, et al. Evaluation of Occupational Exposure Limits for Heat Stress in Outdoor Workers — United States, 2011–2016. *MMWR Morbidity and Mortality Weekly Report*, July 6, 2018; 67(26):733–737. <http://dx.doi.org/10.15585/mmwr.mm6726a1>

¹⁰ Arbury S, Jacklitsch B, Farquah O, et al. Heat Illness and Death Among Workers — United States, 2012–2013. *Center for Disease Control and Prevention MMWR Morbidity and Mortality Weekly Report*, August 8, 2014; 63(31):661–665. <https://www.cdc.gov/mmwr/pdf/wk/mm6331.pdf>

¹¹ Bonauto D, Rauser E, Lim L. Occupational Heat Illness in Washington State, 2000–2009. April 2010. Safety & Health Assessment & Research for Prevention Program, Washington State Department of Labor and Industries; Technical Report Number 59-2-2010.

employees, employers and the medical community^{12, 13} as well as employees' fears of retaliation by their employers. Chronic health conditions such as kidney disease or neurological damages resulting from repeated high heat exposures at work are likely never reported as occupationally-related.

Using workers compensation data from 2000 to 2017, a researcher from the California Department of Public Health (CDPH), Amy Heinzerling, MD, calculated acute heat illness rates and identified nearly 16,000 cases of heat illness among California workers.¹⁴ Although not specific to indoor heat illnesses, this study from Dr. Heinzerling demonstrated that the Bureau of Labor Statistics (BLS) estimates of heat illness in California were consistently lower than the number of cases DIR identified using workers' compensation data.

When comparing the number of indoor heat-related cases identified by DIR to the total number of cases reported by Dr. Heinzerling, approximately 20 percent or less of the total heat-related cases were associated with indoor work environments.

This fraction (20 percent or less) of heat-related illnesses associated with indoor work environments is further supported by the 2007 Occupational Heat Illness in Washington State Study that of the accepted heat-related illness claims, 79 percent occurred outdoors.¹⁵

These studies further support the significance of the increase of indoor heat cases observed by DIR that occurred from 2010 through 2018. This increase, coupled with Cal/OSHA's experience, further confirms that current regulations are not adequately addressing heat illness prevention in indoor places of employment and demonstrates the urgency for addressing this occupational hazard. Given that heat illness can develop very rapidly and is not always obvious before it becomes life-threatening, it is imperative that employers take steps to minimize the occurrence of indoor heat-related illnesses and deaths. Heat illness can disable workers, prevent them from returning to work, and impose high financial costs on the injured workers and their families, employers and insurers.

Some requirements to prevent indoor heat illnesses currently exist, but have not been effective in reducing the number of heat illnesses associated with indoor high-heat environments.

¹² Xiang J, Bi P, Pisaniello D, Hansen A. Health Impacts of Workplace Heat Exposure: An Epidemiological Review. *Industrial Health*. 2014 Mar; 52: 91–101. Published online December 21, 2013.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4202759/pdf/indhealth-52-091.pdf>

¹³ Bonauto D, Rauser E, Lim L. Occupational Heat Illness in Washington State, 2000-2009. April 2010. Safety & Health Assessment & Research for Prevention Program, Washington State Department of Labor and Industries; Technical Report Number 59-2-2010.

¹⁴ Presentation by Dr. Amy Heinzerling, California Department of Public Health. Risk Factors for Heat-Related Illness Among Workers — California, 2000–2017. 68th Annual EIS Conference, April 29, 2019.

¹⁵ Bonauto D, Anderson R, Rauser E, and Burke B. Occupational Heat Illness in Washington State, 1995-2005. *American Journal of Industrial Medicine*, December 2007, 50(12): 940-950.

<https://onlinelibrary.wiley.com/doi/10.1002/ajim.20517>

Employers are currently required by title 8 CCR section 3203 to have an effective Injury and Illness Prevention Program (IIPP) to identify and evaluate workplace hazards, investigate occupational injuries and illnesses, correct unsafe or unhealthful conditions, and provide training and instruction to employees.

In summary, this proposed regulation will ensure that employers with indoor places of employment take preventive steps to ensure that workers have access to drinking water and cool-down areas, are closely observed during acclimatization, are trained, receive timely emergency aid, and in situations of significantly higher heat exposure are protected through mandatory assessment and control measures. Furthermore, to ease employer compliance, and to be consistent with existing regulations, this proposal includes requirements similar to title 8 CCR section 3395, to assist employers that have both indoor and outdoor workers.

There is no existing federal Occupational Safety and Health Administration (OSHA) standard that specifically and comprehensively addresses prevention of heat illness in indoor places of employment. However, federal OSHA does have requirements similar to those in the title 8 standards for drinking water, first aid, and other workplace factors that can be applicable to occupational heat-related illnesses. In October 2021, OSHA issued an Advance Notice of Proposed Rulemaking to begin work on establishing a regulation on heat injury and illness prevention in outdoor and indoor work settings.¹⁶

III. SPECIFIC PURPOSE AND FACTUAL BASIS OF PROPOSED ACTION

The overall intent of this regulatory proposal is to improve worker safety and health, and reduce the incidence and severity of heat-related illnesses for employees working in indoor places of employment. This regulation would also provide for access to drinking water and cool-down areas, require assessment and control measures, emergency response procedures, close observation during acclimatization, effective training and a Heat Illness Prevention Plan (HIPP).

The proposed regulation:

- Is based on the following authority and reference: LC section 142.3, which requires California to adopt occupational safety and health regulations that are equivalent to or more protective of worker health and safety than federal occupational safety and health regulations, and designates the Board as “the only agency in the state authorized to adopt occupational safety and health standards.” (LC section 142.3(a)(1))

¹⁶ United States Department of Labor. Advance notice of proposed rulemaking (ANPRM), Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings, Docket No. OSHA-2021-0009. 2021. <https://www.federalregister.gov/d/2021-23250>

- LC section 144.6 requires the Board to adopt standards regarding harmful physical agents (e.g. heat) that most adequately assure, to the extent feasible, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the harmful physical agent for the period of the employee's working life.
- Is mandated by LC 6720, which requires Cal/OSHA to propose to the Standards Board a regulation that minimizes heat-related illness and injury among workers working in indoor places of employment.
- Differs from existing federal regulations in that the federal OSHA laws and regulations do not include a specific and comprehensive standard to address the prevention of heat illness in indoor places of employment.
- Is not inconsistent or incompatible with existing state regulations. This proposal is not duplicative of section 3395 because it covers indoor workers who were excluded from section 3395. Heat illness is not limited to outdoor work, and many indoor workers face heat illness risks similar to outdoor workers. In addition, section 3203, IIPP, and other existing title 8 standards applicable to heat illness prevention are non-specific and not sufficient by themselves to prevent serious indoor heat-related illnesses. By addressing indoor places of employment, proposed section 3396 will reduce the number and severity of indoor heat related illnesses. These proposed requirements will make indoor worker heat illness protection and preventive measures commensurate to those currently afforded to outdoor workers.
- Will enhance employee safety by clarifying and making more specific requirements for providing potable drinking water and cool-down areas to workers, requiring assessment and control measures, emergency response procedures, close observation during acclimatization, effective training, and a HIPP. These requirements will also make the standard commensurate with section 3395 to improve employer compliance and apply the well-recognized heat illness preventive measures that have been utilized in outdoor places of employment to indoor work environments.

The specific necessity and purpose of the proposed amendments are outlined below:

New Subsection 3396(a). Scope and Application.

This proposed subsection delineates the circumstances under which employers with indoor places of employment must take the specific steps detailed in the standard to reduce heat illnesses. The specific purpose of the proposed subsection is to limit the requirements of the proposed standard to employers with employees having considerable exposure to heat or hot environments.

Proposed subsection (a)(1) establishes the application of the proposed subsection to all indoor places of employment where the temperature equals or exceeds 82 degrees Fahrenheit when employees are present. This subsection is needed to identify when employers must implement specific employee protections required by this section and for employees to know when they have a right to these protections. Due to stakeholder concerns¹⁷ that having the regulation apply when the temperature reaches 80 degrees Fahrenheit would run counter to companies' efforts to conserve energy, the proposal was modified to apply when the temperature reaches 82 degrees Fahrenheit.

The proposed language includes exceptions clarifying that: (A) indoor work areas not listed in subsection (a)(2) do not have to comply with subsection (e) Assessment and Control Measures; and (B) this proposed section does not apply to places of employment where employees are teleworking from a location of the employee's choice, that are not under the control of the employer. This is necessary to ensure that employers with indoor environments with significant exposure to heat and a higher risk of heat illness implement additional protective measures to reduce heat-related deaths, illnesses and injuries while excluding employees who telework.

Proposed subsection (a)(2) outlines the conditions under which employees working in indoor places of employment face a higher risk of heat illness and as such, requires that these employers take assessment and control measures outlined in subsection (e) to protect workers from heat-related deaths, illnesses and injuries. This detailed clarification is necessary to ensure that employers respond to the increased risk of heat-related deaths, illnesses, and injuries, and clearly identify the conditions in which they have to implement further protective measures to keep workers safe.

Proposed subsection (a)(3) establishes that in situations where Cal/OSHA has identified in writing through the issuance of an Order to Take Special Action,¹⁸ that an unsafe workplace condition such as employees working in indoor environments with significant exposure to heat and a risk of heat illness exists, such employers will be required to comply with this specific standard. This is necessary to ensure that workplace conditions not covered by this proposed section, where Cal/OSHA has identified in writing to the employer as unsafe, are made safe by mandating the employer comply with this proposed regulation.

Proposed subsection (a)(4) provides a list of other sections of title 8, some of which are industry specific, and all of which have application to the prevention of heat illness under certain

¹⁷ Phylmar Regulatory Roundtable. Written comments to California Division of Occupational Safety and Health. 2018. <https://dir.ca.gov/dosh/doshreg/Heat-Illness-Prevention-Indoors/Comments-4/Phylmar-Regulatory-Roundtable.pdf>

¹⁸ Title 8 Section 332.3 Issuance of Order to Take Special Action authorizes Cal/OSHA to require employers to comply with applicable provisions of Division 5 of the California Labor Code or with specific standards or orders of the Standards Board whose enforcement upon the employer are at the discretion of Cal/OSHA.

circumstances, to make it clear that employers must continue to comply with these standards to the extent they apply after this proposed standard takes effect.

Proposed subsection (a) also includes clarifying notes that are without direct regulatory effect and do not add any additional regulatory requirements. The first note states that employers may, if they choose, integrate the requirements of the proposed standard into their IIPP that is required by section 3203, their HIPP required by section 3395, or maintained in a separate document. A second clarifying note reiterates Cal/OSHA's authority to enforce the proposed standard and references sections of the LC that prohibit discriminating against employees for exercising their rights provided by this and other occupational safety and health standards. The first note is necessary to provide employers with information to facilitate compliance; the second note is necessary to make employers aware that their responsibilities are not limited to compliance with proposed section 3396, and that employee retaliation is against the law.

New Subsection 3396(b). Definitions.

The proposed subsection (b) provides definitions for the terms used in new section 3396. This subsection is necessary to clarify the application and meaning of the terms used in the proposed regulation.

The definitions of the terms "acclimatization," "environmental risk factors for heat illness," and "heat illness" are identical to those used in section 3395.

"Administrative control" is defined to identify a method to limit exposure to a hazard by adjustment of work procedures, practices, or schedules. Examples of administrative controls include, but are not limited to, acclimatizing employees, rotating employees, scheduling work earlier or later in the day, using work-rest schedules, reducing work intensity or speed, reducing work hours, changing required work clothing, and using relief workers. The definition clarifies the concept of an administrative control that may be effective at minimizing the risk of heat illness in a particular work area.

"Clothing that restricts heat removal" is defined to mean full-body clothing covering the arms, legs, and torso that is any of the following: waterproof; or designed to protect the wearer from a chemical, biological, physical, radiological, or fire hazard; or designed to protect the wearer or the work process from contamination. The definition is necessary to identify clothing properties that restrict heat removal. It includes an exception to the definition to exclude clothing with flame or arc-flash resistant properties demonstrated by the employer to be all of the following: constructed only of knit or woven fibers; worn in lieu of the employee's street clothing; and worn without a full-body thermal or moisture barrier. This exception clarifies that flame or arc-flash resistant clothing meeting all of the specified properties does not restrict heat removal more than typical work clothing does.

“Cool-down area” is defined as an indoor or outdoor area that is blocked from direct sunlight and shielded from other high radiant heat sources and is either open to the air or provided with ventilation or cooling. It lists the locations which are not acceptable as cool-down areas, such as locations where: environmental risk factors defeat the purpose of allowing the body to cool; or where employees are exposed to unsafe or unhealthy conditions; or where employees are deterred or discouraged from accessing or using the cool-down area. The definition is necessary to make employers aware of specific conditions for cool-down areas and to ensure employees have a suitable place to cool down and successfully reduce the risk of heat-related illnesses.

“Engineering control” is defined to mean a method of control or a device that removes or reduces hazardous conditions or creates a barrier between the employee and the hazard. Examples of engineering controls include, but are not limited to: isolation of hot processes, isolation of employees from sources of heat, air conditioning, cooling fans, cooling mist fans, evaporative coolers (also called swamp coolers), natural ventilation where the outdoor temperature or heat index is lower than the indoor temperature or heat index, local exhaust ventilation, shielding from a radiant heat source, and insulation of hot surfaces. The definition clarifies the concept of an engineering control that may be effective at minimizing the risk of heat illness in a particular work area and provides employers with specific examples of appropriate engineering control methods.

“Globe temperature” is defined as the temperature measured by a globe thermometer, which consists of a thermometer sensor in the center of a six-inch diameter hollow copper sphere painted on the outside with a matte black finish or equivalent. The globe thermometer may not be shielded from direct exposure to radiant heat while the globe temperature is being measured. This definition is necessary to ensure that employers taking the globe temperatures do so using accurate equipment and methods.

“Heat wave” is defined as any day in which the predicted high outdoor temperature for the day will be at least 80 degrees Fahrenheit and at least ten degrees Fahrenheit greater than the average high daily outdoor temperature for the preceding five days. This definition will help employers identify a heat wave, during which time a supervisor or designee must closely observe all employees when no effective engineering controls are in use.

“Heat index” is defined as a measure of heat stress developed by the National Weather Service (NWS) for outdoor environments that takes into account the dry bulb temperature and the relative humidity. For purposes of this standard, heat index refers to conditions in indoor work areas. Radiant heat is not included in the heat index. A note is added to the definition of “heat index” that references a chart listing NWS heat index values (2019) in Appendix A to section 3396.

This definition is necessary to provide employers a means of determining the heat index from the dry bulb temperature and the relative humidity for employers who elect not to purchase a heat index meter.

“High radiant heat area” is defined as a work area where the globe temperature is at least five degrees Fahrenheit greater than the temperature, as defined in this subsection. This definition will help employers identify high radiant heat areas.

“Indoor” is defined as a space that is under a ceiling or overhead covering that restricts airflow; and is enclosed along its entire perimeter by walls, doors, windows, dividers, or other physical barriers that restrict air flow, whether open or closed. All work areas that are not indoor are considered outdoor and covered by section 3395. The definition includes an exception that indoor does not refer to a shaded area that meets the requirements of subsection 3395(d) and is used exclusively as a source of shade for employees covered by section 3395. This definition is necessary to clarify whether the work area is considered indoor for the purposes of this proposed regulation.

“Personal heat-protective equipment” is defined as equipment worn to protect the user against heat illness. Examples of personal heat-protective equipment include, but are not limited to, water-cooled garments, air-cooled garments, cooling vests, wetted over-garments, heat reflective clothing, and supplied-air personal cooling systems. The definition is necessary to identify equipment that may be effective at minimizing the risk of heat illness in a particular work area and provides examples.

“Personal risk factors for heat illness” means factors such as an individual's age, degree of acclimatization, health, water consumption, alcohol consumption, caffeine consumption, and use of medications that affect the body's water retention or other physiological responses to heat.

“Preventative cool-down rest” is defined as a rest taken in a cool-down area to prevent overheating. The definition is necessary to distinguish preventative cool-down rests from other rest periods.

“Radiant heat” is defined as heat transmitted by electromagnetic waves and not transmitted by conduction or convection. Sources of radiant heat include the sun, hot objects, hot liquids, hot surfaces, and fire. The definition is necessary to distinguish radiant heat from other types of heat sources.

“Relative humidity” is defined as the amount of moisture in the air relative to the amount that would be present if the air were saturated. The definition is necessary to account for relative humidity in the determination of the heat index.

“Shielding” is defined as a physical barrier between radiant heat sources and employees that reduces the transmission of radiant heat. The definition is necessary to clarify that shielding used as an engineering control must reduce the transmission of radiant heat.

“Temperature” is defined as the dry bulb temperature in degrees Fahrenheit obtainable by using a thermometer freely exposed to the air without considering humidity or radiant heat, to measure the temperature in the immediate area where employees are located. The definition is necessary to specify a simple and uniform technique for obtaining the workplace temperature used as the basis for several proposed new requirements of the regulation.

“Union representative” is defined as a recognized or certified collective bargaining agent representing the employees. The definition is necessary to identify who is considered a union representative for the purposes of obtaining the active involvement of employees and their union representatives as required by subsection (e)(1)(D).

New Subsection 3396(c). Provision of Water.

Proposed subsection (c) details requirements for the provision of drinking water, which are identical to section 3395 with the exception of a new requirement to provide water in indoor cool-down areas. The purpose of this proposed subsection is to harmonize with existing drinking water requirements for outdoor heat illness protection and to ensure quick access to drinking water as a means of controlling heat illness. This subsection is also necessary to ensure that employees are provided with water quantities sufficient to maximize the effectiveness of drinking water as a measure to prevent heat illness.

New Subsection 3396(d). Access to Cool-Down Areas.

Proposed subsection (d) details requirements for access to cool-down areas which are nearly identical to section 3395 access to shade requirements. The term “cool-down area” is used in lieu of the term “shade” to clarify that a cool-down area can be indoors or outdoors.

Proposed subsection (d)(1) requires the employer to have and maintain cool-down areas at all times while employees are present. It further details requirements such as size, location and temperature for the cool-down area. The proposed temperature for indoor cool-down areas must be maintained at less than 82 degrees Fahrenheit, which is the trigger temperature for the proposed standard, unless the employer demonstrates it is infeasible. This subsection is necessary to ensure that employees in need of a preventative recovery period have a suitable place to cool down and successfully reduce the risk of heat-related illnesses.

Proposed subsection (d)(2) requires employers to allow and encourage employees to take preventative cool-down rests in a cool-down area when they feel the need to do so to protect themselves from overheating. It further instructs employers to take specific steps to attend to

employees that take preventative cool-down rests. These steps include (A) monitoring and asking employees if they are experiencing symptoms of heat illness; (B) encouraging employees to remain in the cool-down area; and (C) not ordering employees back to work prematurely. This subsection is necessary to ensure that employees take preventative cool-down rests and are monitored for symptoms to reduce the risk of heat-related illnesses.

Proposed subsection (d)(3) requires the employer to provide first aid or emergency response to employees who exhibit signs or report symptoms of heat illness while taking a preventative cool-down rest or during a preventative cool-down rest period. This is necessary to ensure that employees receive prompt medical attention to reduce the severity of heat-related illnesses.

New Subsection 3396(e). Assessment and Control Measures.

Proposed subsection (e) details requirements for identifying and controlling environmental factors present at the workplace which increase the occurrence of heat-related deaths, illnesses, and injuries. This is necessary to ensure that workplaces with conditions listed in subsection (a)(2) take additional steps to reduce the increased risk of heat-related deaths, illnesses, and injuries.

Proposed subsections (e)(1)(A) through (e)(1)(D) specify how and when the employer must measure the temperature and heat index, record whichever is greater, and identify and evaluate all other environmental risk factors for heat illness.

Proposed subsection (e)(1)(A) requires the employer to establish and maintain accurate records of either the temperature or heat index measurements, whichever value is greater, as required by subsection (e)(1). The records must include the date, time, and specific location of all measurements. This is necessary to ensure that accurate recordkeeping takes place and that such records are useful, informative and made available for review by employees and representatives of Cal/OSHA upon request.

Proposed subsection (e)(1)(B) requires the employer to take temperature or heat index measurements, as required by subsection (e)(1), where employees work and at times during the work shift when employee exposures are expected to be the greatest. Further it requires that: initial measurements be taken when it is reasonable to suspect that subsection (e) applies; measurements be taken again when they are reasonably expected to be 10 degrees or more above the previous measurements; and temperature or heat index records be retained for 12 months or until the next measurements are taken, whichever is later, and made available at the worksite to employees and to representatives of Cal/OSHA upon request. This is necessary to inform employers when they need to take measurements to assess the temperature or heat index in the workplace; to provide employee access to such measurements; and to clarify how long such records need to be kept.

Proposed subsection (e)(1)(C) requires that instruments used to measure the temperature or heat index be used and maintained according to the manufacturers' recommendations. Instruments used to measure the heat index must utilize the NWS heat index tables. This is necessary to ensure that employers who measure the temperature or heat index do so using accurate equipment and methods.

Proposed subsection (e)(1)(D) requires the employer to have effective procedures to obtain the active involvement of employees and their union representatives in the following: planning, conducting, and recording the measurements of temperature or heat index, whichever is greater; and identifying and evaluating all other environmental risk factors for heat illness. This is necessary to ensure that employees and their union representatives are afforded the opportunity to provide insights into the measurements of temperature or heat index and identification and evaluation of environmental risk factors for heat illness that employees are actually exposed to. This requires the employer to actively seek employee engagement to successfully identify the operations or work areas with a higher risk of heat illnesses.

An exception is provided at subsection (e)(1) that allows the employer to assume a work area is subject to one or more of the conditions listed in subsection (a)(2) and therefore comply with subsection (e)(2) in lieu of complying with subsection (e)(1). This gives the employer the option to forego measuring and recording temperatures.

Proposed subsections (e)(2)(A) through (e)(2)(C) outline control measures to minimize the risk of heat illness. These detailed requirements are necessary to ensure that employers address the environmental risk factors for heat illness present in the work area.

Proposed subsection (e)(2)(A) requires that engineering controls be used to reduce and maintain the temperature and heat index to below 87 degrees Fahrenheit when employees are present or the temperature to below 82 degrees Fahrenheit where employees wear clothing that restricts heat removal or work in high radiant heat areas and to otherwise minimize the risk of heat illness, except to the extent that the employer demonstrates such controls are infeasible.

Proposed subsection (e)(2)(B) requires that where feasible engineering controls are not sufficient to reduce and maintain the temperature and heat index to below 87 degrees Fahrenheit when employees are present or the temperature to below 82 degrees Fahrenheit where employees wear clothing that restricts heat removal or work in high radiant heat areas, administrative controls must be used to minimize the risk of heat illness, except to the extent that the employer demonstrates such controls are infeasible.

Proposed subsection (e)(2)(C) requires that where feasible engineering controls and administrative controls are not sufficient to reduce and maintain the temperature and heat index to below 87 degrees Fahrenheit when employees are present or the temperature to

below 82 degrees Fahrenheit where employees wear clothing that restricts heat removal or work in high radiant heat areas, personal heat-protective equipment must be used to minimize the risk of heat illness, except to the extent that the employer demonstrates that use of such equipment is infeasible.

Proposed subsections (e)(2)(A) through (e)(2)(C) are necessary to clarify for employers that engineering controls, administrative controls and personal heat-protective equipment are appropriate to reduce employees' risk of heat illness. These proposed subsections will provide greater protection from high levels of indoor heat and thereby prevent and reduce the severity of heat illnesses for employees working indoors under high heat conditions.

New Subsection 3396(f). Emergency Response Procedures.

Proposed subsection (f) details requirements for implementing effective emergency response procedures which are identical to those in section 3395. Emergency response procedures must include maintaining effective communication; responding to signs and symptoms of possible heat illness; contacting emergency medical services; and ensuring that clear and precise directions to the work site are provided to emergency responders. This is necessary to ensure that there are no delays in providing emergency medical services thereby minimizing the severity of heat-related illnesses or fatalities.

New Subsection 3396(g). Close Observation During Acclimatization.

Proposed subsection (g) details specific requirements for when close observation by a supervisor or designee is required, which are similar to those in section 3395. Proposed subsection (g)(1) requires close observation of all employees where no effective engineering controls are in use to control the effect of outdoor heat on indoor temperature during a heat wave. Subsection (g)(2) lists the trigger temperature or heat index that requires close observation of an employee who has been newly assigned to a work area, or work involving the use of clothing that restricts heat removal, or a high radiant heat area. This subsection is necessary for unacclimatized employees to ensure that employers increase their vigilance to recognize the early symptoms of heat illness and take immediate steps to interrupt the heat illness cycle, prevent a fatality or reduce the severity of the illness.

New Subsection 3396(h). Training.

Proposed subsection (h) details the specific topics that employee and supervisory training shall include, and are identical to those in section 3395.

Subsection (h)(1) clearly states the information required to be provided to supervisory and non-supervisory employees before the employee begins work, which include the role environmental and personal risk factors play in exacerbating the risk of heat illness, a description of the

employer's procedures, employees' rights, an explanation of the importance of drinking small quantities of water frequently, the importance of acclimatization and close observation, the signs and symptoms of heat illness along with the appropriate first aid and the importance of immediately reporting their signs and symptoms, the employer's procedures for responding to possible heat illness and for contacting emergency services, and lastly, the employer's procedures for ensuring that clear and precise directions are provided to emergency responders. This subsection is necessary to ensure that supervisory and non-supervisory employees acquire the necessary knowledge to understand the roles that environmental and personal risk factors, dehydration, overheating and lack of acclimatization, etc., play in exacerbating the risk of heat illness; and follow the employer's instructions and procedures to keep themselves safe.

Subsection 3396(h)(2) includes additional training that must be provided to supervisors so that they know the procedures to follow to implement the applicable provisions in this section; the procedures to follow when an employee exhibits signs or reports symptoms consistent with possible heat illness, including emergency response procedures; and how to monitor weather reports and how to respond to hot weather advisories. This subsection is necessary to ensure that supervisors acquire the necessary knowledge of the employer's procedures and implement them when necessary.

New Subsection 3396(i). Heat Illness Prevention Plan.

The proposed subsection (i) requires employers to establish, implement, and maintain an effective HIPP, which is very similar to the HIPP required by subsection 3395. The written plan must be in both English and the language understood by the majority of the employees and be available at the worksite to employees and to representatives of Cal/OSHA upon request. The HIPP may be included as part of the employer's Illness and Injury Prevention Program required by section 3203 or HIPP required by section 3395. At a minimum, the plan shall cover procedures for the provision of water and access to cool-down areas; the assessment and control measures of work areas as required by subsection (e); emergency response procedures; and close observation during acclimatization. This subsection is necessary to ensure that the procedures are understood by employees, documented in writing, and available for future reference.

New Appendix A to New Section 3396. National Weather Service Heat Index Chart (2019).

The proposed Appendix A is a chart listing NWS heat index values (2019). This is necessary to provide employers a reference for determining the heat index from the dry bulb temperature and the relative humidity for employers that elect not to purchase heat index meters. The color coding and associated and risk categories from the NWS Heat Index Chart were not included in proposed Appendix A based on a decision from the Occupational Safety and Health Review

Commission that found the NWS Heat Index Chart was scientifically based, but that the color coding and associated risk categories were not.¹⁹

IV. REFERENCE TO COMPARABLE FEDERAL REGULATION

No federal law or regulation exists or has been promulgated that specifically addresses occupational exposure to the prevention of heat illness in indoor places of employment. In October 2021, federal OSHA issued an Advance Notice of Proposed Rulemaking to begin work on establishing a regulation on heat injury and illness prevention in outdoor and indoor work settings.

V. TECHNICAL, THEORETICAL AND/OR EMPIRICAL STUDIES, REPORTS OR DOCUMENTS RELIED ON BY THE BOARD

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6. Chapman CL, Johnson BD, Vargas NT, et al. Both hyperthermia and dehydration during physical work in the heat contribute to the risk of acute kidney injury. Journal of Applied Physiology. April 1, 2020; 128(4): 715-728. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7191500/>
7. Division of Workers' Compensation (DWC) email from Meitong Jin, DWC, to Amalia Neidhardt, Cal/OSHA, October 9, 2019.
8. Cal/OSHA Heat Illness Prevention in Indoor Places of Employment Advisory Committee Meetings. Meeting minutes including list of attendees. February 28, 2017

¹⁹ Occupational Safety and Health Review Commission (OSHRC). United States Postal Service OSHRC Docket No.: 16-1713. Page 48. July 29, 2020. https://www.oshrc.gov/assets/1/6/16-1713_Decision_and_Order_-_dated.pdf.

(<https://www.dir.ca.gov/dosh/doshreg/Heat-Illness-Prevention-Indoors/Minutes.2017-02-28.pdf>), May 25, 2017 (<https://www.dir.ca.gov/dosh/doshreg/Heat-Illness-Prevention-Indoors/Minutes-2017-05-25.pdf>), and February 8, 2018 (<https://www.dir.ca.gov/dosh/doshreg/Heat-Illness-Prevention-Indoors/Minutes-2018-02-08.pdf>)

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These documents are available for review BY APPOINTMENT Monday through Friday from 8:00 a.m. to 4:30 p.m. at the Standards Board Office located at 2520 Venture Oaks Way, Suite 350, Sacramento, California. Appointments can be scheduled via email at oshsb@dir.ca.gov or by calling (916) 274-5721.

VI. PETITION

This proposal was not the result of a petition.

VII. ADVISORY COMMITTEE

This proposal was developed with the assistance of an advisory committee. Advisory committee minutes and list of attendees are included as Documents Relied Upon.

VIII. FIRE PREVENTION STATEMENT

This proposal does not include fire prevention or protection standards. Therefore, approval of the State Fire Marshal pursuant to Government Code Section 11359 or Health and Safety Code Section 18930(a)(9) is not required.

IX. SPECIFIC TECHNOLOGY OR EQUIPMENT

This proposal mandates the use of thermometers and humidity gauges, or other instrument(s) to measure the temperature and heat index.

X. STANDARDIZED REGULATORY IMPACT ASSESSMENT (SRIA)

A cost-benefit analysis cannot be used as a basis for adopting an occupational safety and health standard. In *American Textile Manufacturers Institute, Inc. v. Donovan* (1981),²⁰ the U.S. Supreme Court held that:

Congress itself defined the basic relationship between costs and benefits by placing the “benefit” of worker health above all other considerations save those making attainment of this “benefit” unachievable. Any standard based on a balancing of costs and benefits by the Secretary that strikes a different balance than that struck by Congress would be inconsistent with the command set forth in §6(b)(5) [Section (6)(b)(5) of the Occupational Safety and Health Act of 1970].

Section 144.6 of the LC is nearly identical to section (6)(b)(5) of the Occupational Safety and Health Act. In addition, LC section 142.3 requires California occupational safety and health regulations to be at least as effective as federal regulations, so the cost-benefit balance established by Congress must be observed in establishing California occupational safety and health regulations.

The Board is proposing a new section to the General Industry Safety Orders in title 8 for indoor heat illness prevention to provide better protections for workers laboring in indoor places of employment. The SRIA analyzes the economic impacts of the proposed new regulation. The SRIA is included in the Documents Relied Upon.

The RAND Corporation assessed the costs and benefits of the proposed new regulation for heat illness prevention in indoor places of employment (title 8 CCR section 3396) in its SRIA (Metz, et al. 2021).²¹ The results of the analysis are detailed below, respective to requirements for the SRIA.

The creation or elimination of jobs in the state.

The statewide employment impacts of the proposed regulation are estimated to be small, but positive due to new expenditures on heating, ventilation and air-conditioning (HVAC) equipment and services and other changes in the value of purchases made by final users of these products and services. It is estimated that there will be a temporary increase of approximately 142 jobs in the first year of the proposed regulation and an average of approximately 50 additional jobs supported in subsequent years relative to the *no regulatory*

²⁰ U.S. Supreme Court. *American Textile Mfrs. Inst., Inc. v. Donovan*, 452 U.S. 490 (1981). 452 U.S. 490.
<https://supreme.justia.com/cases/federal/us/452/490/>

²¹ Metz D, Prier S, Miller BM. RAND Corporation. Standardized Regulatory Impact Assessment (SRIA) of the Proposed California Regulation for Heat Illness Prevention in Indoor Places of Employment. September 2021.
<https://dof.ca.gov/wp-content/uploads/sites/352/Forecasting/Economics/Documents/Indoor-Heat-Illness-Prevention-SRIA.pdf>

action baseline. These changes represent less than a 0.01 percent increase in employment in California. There are no direct, indirect, or induced job losses as a result of the labor impacts of the proposed regulation because the labor costs to individual businesses are relatively small and more than offset by productivity gains associated with businesses implementing engineering controls to reduce occupational exposure to extreme heat.

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

There is no anticipated elimination of any existing businesses in California as a result of the proposed regulation. The increase in final demand for engineering controls may lead to increases in the number of businesses manufacturing these products and companies specializing in installation of HVAC systems. Furthermore, increases in productivity across several sectors may result in a small increase in the number of businesses that supply products and services to these industries. However, the overall macroeconomic impacts of the proposed regulation are very small relative to the overall California economy (less than a 0.01 percent change); therefore, it is not anticipated there will be substantial impacts to the creation of new businesses.

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

The proposed regulation is unlikely to have a significant competitive advantages or disadvantages for businesses operating in California. The estimated costs of the proposed regulation are relatively small on a per establishment basis; however, the additional requirements add to the costs of doing business in California. It is assumed that other reasons for doing business in California likely outweigh the costs associated with the proposed regulation. Furthermore, it is assumed the proposed regulation will not significantly impact the ability of California businesses to compete with businesses in other states with similar climate and geographic conditions (and comparable industrial processes that generate heat) that pose a similar risk of heat-related illness to workers.

The increase or decrease of investment in the state.

The implementation of the proposed regulation is likely to increase investments in systems and processes to reduce temperatures in indoor workspaces when employees are present, which may provide an opportunity for existing facilities to evaluate other investments in automation and technology. However, for many industries, the investment in HVAC systems is likely to be very small on a per establishment basis. The majority of employers in California have already made investments in such HVAC systems or rely on natural ventilation or other control measures and will incur few additional compliance costs associated with engineering controls. In the long run it is expected the proposed regulation may slightly increase average annual investment in the repair, replacement, and operation and maintenance of HVAC systems.

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

The proposed indoor heat illness prevention regulation provides an incentive for employers with hot indoor environments to reduce the temperature or heat index below the regulatory thresholds because those workplaces would no longer be subject to the more stringent (and costly) requirements of the proposed rule. This incentive to avoid more costly regulatory requirements is in addition to pre-existing incentives to mitigate indoor heat to avoid worker injuries and increase worker productivity. Although many companies already have temperature control systems in place due to these pre-existing incentives, the proposed regulation will likely increase the demand for HVAC systems. There is likely to be a particular need to reduce temperatures in large warehouses, manufacturing and production facilities, greenhouses, and wholesale and retail distribution centers—as well as improve airflow and exhaust systems in smaller hot indoor environments, such as restaurant kitchens and dry cleaners. As a result, there may be an increase in demand for innovative products, materials, or processes to cool these types of work environments and generate new processes that are more energy efficient, less costly, and generate less heat.

In addition to mechanical adaptations, affected employers may also innovate through changes in processes and procedures. For example, employers may incentivize supervisors to provide additional cool-down rest breaks in the summer months and during heat waves. Certain industries already move work shifts to cooler times of the day or schedule additional breaks to reduce exposure to heat; the prevalence of these adaptations may increase to avoid working during periods of time when the more stringent (and costly) requirements of the proposed rule would apply.

Costs to Employers to Comply with Proposed Regulations

Individuals and businesses in a wide range of industries may be impacted by the proposed regulation. DIR developed a three-tier classification system to categorize industries based on the likelihood that employees are exposed to temperatures (or a heat index) at or above the regulatory thresholds in the proposed regulation. In Type 1 industries there is generally an indoor heat source – such as a furnace, kiln, or stove – or a greenhouse, nursery, or warehouse – where the temperature inside the establishment is significantly affected by the temperature and amount of sunlight outside the establishment – and a portion of the workforce is likely exposed to hot indoor work environments. In Type 2 industries there is a mix of establishments, some of which may expose workers to hot indoor work environments depending on the establishment’s location, whether or not the work takes place indoors, and whether or not the workplace is climate controlled. DIR estimates that 50 percent of establishments in Type 2 industries are likely to have indoor environments where employees are exposed to temperatures at or above the threshold. In Type 3 industries, most employees generally work outdoors or in climate controlled indoor work environments. Type 3 industries are unlikely to be affected by the proposed regulation and are not included in this analysis.

One hundred eighty industries will be affected by this proposal and span the following sectors: NAICS 11, 21, 22, 23, 31-33, 42, 44-45, 48-49, 56, 72, 81, and 92. DIR estimates that 196,812 establishments will be impacted by the proposed regulation. Of these, there are 195,462 private sector establishments.²²

The California legislature defines small businesses as businesses that have fewer than 100 employees, are not dominant in their field, and are independently owned and operated (Assembly Bill 1033, Ch. 346, 2016). Using data from the U.S. Census Bureau's County Business Patterns and the U.S. Department of Agriculture's Census of Agriculture, the Board estimates that approximately 97.5 percent of establishments, or 190,604 establishments, in affected industries have less than 100 employees or are considered small family farms. Since the vast majority of affected establishments are considered small businesses, the typical costs for a small business are estimated to be the same as for a typical establishment under the proposed regulation.

The total direct compliance costs of the proposed regulation to businesses vary across industries and over time as many of the requirements require both upfront and recurring investments in various heat illness prevention measures. The estimated costs are subject to uncertainty regarding the number of establishments potentially affected by the proposed regulation. This is due, in part, to incomplete information regarding the indoor temperatures in those facilities under regular operations, the extent and overall effectiveness of existing measures to regulate indoor temperatures and protect workers from heat stress, and annual variation in outdoor temperatures and other climate factors. Therefore, additional sensitivity analyses were used to provide a low-end and high-end estimate. There are no direct costs to individuals.

Establishments affected by the proposed regulation will incur costs to provide employees access to cool-down areas and drinking water free of charge; conduct trainings on safety procedures, identifying signs and symptoms of heat illness, and compliance with the regulation; develop a heat-illness prevention plan; measure and maintain records of the temperature or heat index; and use feasible engineering and/or administrative control measures, or provide personal heat-protective equipment.

The largest costs will be incurred by restaurants, other eating places, and special food services (approximately 40 percent of all regulated establishments representing 26 percent of the total cost of the proposal); transportation and warehousing, which has the highest per establishment costs; and manufacturing, which has the largest number of subsectors affected by the proposed regulation. These sectors account for approximately 70 percent of the total costs of the standard.

²² Department of Industrial Relations/Occupational Safety & Health Standards Board. Attachment to Economic and Fiscal Impact Statement (STD 399) for Heat Illness Prevention in Indoor Places of Employment. 2022.

The total direct compliance costs of the proposed indoor heat standard to businesses is \$213 million in 2023 (with a range from \$158 to \$268 million) and \$87 million in each subsequent year from 2024 to 2032 (with a range of \$64 to \$111 million) on an undiscounted annualized basis. Thus, the total direct costs of the proposed regulation are approximately \$1.0 billion over 10 years (with a range of \$0.7 to \$1.3 billion). These costs are largely driven by two factors: (1) the use of engineering controls, such as evaporative coolers, local exhaust ventilation, air conditioning, or cooling fans, and (2) labor costs related to training employees on identifying risk factors and common signs and symptoms of heat illness, appropriate first aid and/or emergency response, and the importance of frequent consumption of small quantities of water in hot work environments as well as providing access to cool-down areas when any of the regulatory thresholds have been reached.

Fiscal Impacts to Local and State Government

The proposed regulation will result in new compliance actions imposed on local government establishments. Based on information from the California Employment Development Department (EDD) Labor Market Information Division, Quarterly Census of Employment and Wages (QCEW), there are 994 local government establishments in industries subject to the proposed regulation. Of these, 233 local government establishments are in Type 1 industries and 761 local government establishments are in Type 2 industries; however, approximately half of the Type 2 local government establishments are not likely to be subject to the indoor heat requirements as they contain climate-controlled work environments or have been determined not to exceed the temperature thresholds. Therefore, the remaining 614 local government establishments (233 Type 1 industries + 381 Type 2 industries) are estimated to incur costs totaling approximately \$1.3 million in 2023 and \$0.6 million in each subsequent year on an undiscounted annualized basis.

The proposed regulation will also result in new compliance actions imposed on state government entities, specifically correctional institutions (NAICS 922140). Based on information from the California EDD's QCEW, there are approximately 1,500 state-run correctional institutions subject to the proposed regulation. Of these, approximately half are not likely to be subject to the indoor heat requirements due to locational factors or because the workplace is already climate controlled. The remaining establishments are estimated to incur costs totaling approximately \$0.9 million in 2023 and \$0.4 million in each subsequent year on an undiscounted annualized basis.²³

Enforcement Costs

Cal/OSHA will enforce the proposed regulation and estimates that the proposed regulation may result in 15 to 25 additional inspections per year. DIR estimates that overall enforcement

²³ Department of Industrial Relations/Occupational Safety & Health Standards Board. Attachment to Economic and Fiscal Impact Statement (STD 399) for Heat Illness Prevention in Indoor Places of Employment. 2022.

efforts, including additional inspections, will require up to one additional full-time equivalent safety engineer. The total salary of an experienced safety engineer plus fringe benefits, equipment, materials, and transportation is estimated to cost approximately \$0.2 million per year.²⁴

XI. BENEFITS OF THE PROPOSED ACTION

The benefits of the regulation, 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.

Regulations that limit workplace exposure to harmful environmental conditions may yield benefits in the form of avoided costs associated with injuries, morbidity (i.e., induced illness) and, in extreme cases, premature death. Heat-related stress can cause health effects ranging from minor (e.g., heat rash or heat cramps) to intermediate (e.g., heat exhaustion) to major (e.g., rhabdomyolysis, heat stroke, permanent disability, and death). The amount of time it is considered safe for employees to work in hot environments depends on the conditions that affect body temperature including ambient temperature level, humidity level, length of exposure, intensity of task, and personal physical characteristics. By limiting the maximum heat that employees are exposed to, the proposed regulation is designed to reduce the incidence of heat-related illnesses and deaths. Additionally, there is evidence that worker productivity declines in hot environments indoors both because employees work fewer hours and because the hours worked become less productive. The benefits include potential productivity gains from limiting exposure to extreme heat through responses to the proposed regulation that would limit employee exposure. Limiting exposure to extreme heat will also improve the quality of life of workers.

The proposed regulation is anticipated to provide benefits to both individuals and businesses. Individuals are anticipated to benefit from reduced risk of occupational heat-related illness and death. Business are anticipated to benefit from increased labor output by using control measures, such as engineering or administrative controls to mitigate employee exposure to hot indoor temperatures. Based on information provided by industry representatives, a vast majority of establishments in certain industries (such as indoor establishments with a long-history of working with “hot” processes) have existing measures in place to prevent heat-related illness. The pre-existing adoption of control measures in many industries, which is accounted for in this analysis, suggests that many companies may already view the benefits to their business as exceeding the cost of undertaking those measures.

Incentives to innovate new processes that are more energy efficient, produce less heat, and are less costly will benefit the environment and the welfare of California residents. New more

²⁴ The full text of the SRIA is available at: <https://dof.ca.gov/wp-content/uploads/sites/352/Forecasting/Economics/Documents/Indoor-Heat-Illness-Prevention-SRIA.pdf>

energy efficient cooling technologies and processes that produce less heat developed in response to this proposal can be used by households and entities outside of employers covered by the regulation to save money and reduce energy consumption. Saving money will benefit California residents. Using less energy will benefit the environment.

Assessing and determining the benefits of the proposed regulation, expressed in monetary terms to the extent feasible and appropriate.

First, to monetize avoided fatalities, guidance from the U.S. Department of Transportation was used, which recommends valuing mortality risk reductions based on estimates of the value of a statistical life (VSL). VSL is defined as individuals' willingness to pay (WTP) for improvements in safety that result in a small risk reduction in likelihood of a fatal illness/injury. Second, to monetize avoided cases of non-fatal illness/injury from occupational indoor heat exposure estimates from the WTP economic literature on the dollar value of preventing an injury was used. Third, to monetize productivity benefits, estimates from the economic literature on payroll effects from occupational heat exposure for "highly exposed" industries was used.

The effectiveness of the proposed regulation in reducing heat-related illnesses and deaths is uncertain; therefore, a range of estimates using low-end and high-end assumptions for the number of future incidents that may be prevented is used. The primary estimate of the total direct benefits is \$404 million (with a range from \$257 to \$678 million) on an undiscounted annualized basis—or \$4.0 billion over 10 years (with a range from \$2.6 to \$6.8 billion). Economic impacts to individuals ("health impacts") are estimated to account for approximately 43 percent of the total, or \$1.7 billion, and economic impacts to businesses ("productivity impacts") are estimated to account for approximately 57 percent of the total, or \$2.3 billion, on an undiscounted basis.

The number of public employees who may avoid a potentially serious heat-related illness or death due to the proposed regulation is uncertain. There are approximately 14,600 local government employees in affected industries, which represents about 1 percent of all affected workers. Of these, there are approximately 10,300 state government employees working in correctional institutions based on information from the California EDD's QCEW. Many of these employees work in climate controlled indoor work environments; those that do not (e.g., those working in older state prisons that are not climate controlled) would benefit from compliance actions that limit their occupational exposure to extreme heat conditions. To the extent that the proposed regulation improves the safety and health of public employees – resulting in fewer heat-related illnesses – the proposed regulation would result in a cost savings for public entities. However, there is insufficient information to estimate the number of state and local government employees treated each year for heat-related illnesses in the baseline. Given the relatively small number of affected state and local government employees – and that many work in industries that already have outdoor workers subject to section 3395 requirements – this impact is not expected to be large.

Similarly, productivity benefits that accrue to state and local government employees may result in cost savings to public entities. However, the SRIA estimates very few public employees will benefit from the added use of engineering controls as a result of the proposed regulation as many state and local government employers already use control measures to reduce occupational exposure to extreme heat.

Other Benefits

The above estimates do not attempt to quantify all monetary benefits from the proposed regulation. The estimated potential health impacts omit injuries that are too small to qualify for worker's compensation. There are insufficient data to quantify avoided health damages for minor illnesses and other health impacts that are too small to qualify for worker's compensation but would be avoided under the proposed regulation. In addition, avoiding future claims for heat-related illnesses may also reduce workers' compensation insurance premiums paid by employers. There are insufficient data to estimate this impact, although given the relatively small number of annual workers' compensation claims for heat-related illness it is not anticipated to be a large effect. Similarly, while preventing heat illness may create additional benefits for employers by reducing the number of heat-related incidents that require specific emergency response procedures that may disrupt productivity, there are insufficient data to estimate this impact.

Occupational heat illness is the strongest risk factor for chronic kidney disease of nontraditional origin^{25, 26, 27, 28} which can result in costly long term illness and possibly death. However, these cases are not captured by the workers compensation system due to the delayed onset of disease, so the benefits in preventing these injuries, although high, cannot be determined without data.

Making the estimation described in Government Code Section 11342.548.

The proposed rulemaking has been determined to be a major regulation because the economic impact of the regulation in California is estimated to exceed \$50 million in each year (both in terms of costs and benefits, separately) after the rule is finalized. The impacts are the result of

²⁵ Wesseling C, Glaser J, Rodríguez-Guzmán J, et al. Chronic kidney disease of non-traditional origin in Mesoamerica: a disease primarily driven by occupational heat stress. *Rev Panam Salud Publica*. 2020; 44:e15. <https://doi.org/10.26633/RPSP.2020.15>

²⁶ Hansson E, Glaser J, Jakobsson K, Weiss I, et al. Pathophysiological mechanisms by which heat stress potentially induces kidney inflammation and chronic kidney disease in sugarcane workers. *Nutrients*. 2020; 12(6): 1639. <https://doi.org/10.3390/nu12061639>

²⁷ Tannis C. Letter to the editor: Heat illness and renal injury in mail and package delivery workers. *American Journal of Industrial Medicine* 63:1059-1061. August 24, 2020. <https://onlinelibrary.wiley.com/doi/10.1002/ajim.23169>

²⁸ Chapman CL, Johnson BD, Vargas NT, et al. Both hyperthermia and dehydration during physical work in the heat contribute to the risk of acute kidney injury. *Journal of Applied Physiology*. April 1, 2020; 128(4): 715-728. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7191500/>

direct costs associated with compliance with the indoor heat illness prevention requirements and monetized benefits in terms of avoided illnesses, injuries, permanent disabilities, deaths, and productivity losses to individuals and businesses within the state.

XII. EVIDENCE SUPPORTING FINDING OF NO SIGNIFICANT STATEWIDE ADVERSE ECONOMIC IMPACT DIRECTLY AFFECTING BUSINESSES

DIR 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. The estimated costs of the proposed regulation are relatively small on a per establishment basis; however, the additional requirements add to the costs of doing business in California. It is assumed that other reasons for doing business in California likely outweigh the costs associated with the proposed regulation. Furthermore, it is assumed that the proposed regulation will be unlikely to significantly impact the ability of California businesses to compete with businesses in other states with similar climate and geographic conditions (and comparable industrial processes that generate heat) that pose a similar risk of heat-related illness to workers.²⁹

XIII. REASONABLE ALTERNATIVES TO THE PROPOSAL AND THE BOARD'S REASONS FOR REJECTING THOSE ALTERNATIVES

Cal/OSHA held three advisory committee meetings to develop a proposed regulation for minimizing heat-related illness among workers in indoor places of employment. At these meetings, several alternatives to the proposed language were considered and ultimately discarded as being overly complex, difficult to comply with, non-protective, or inconsistent with existing regulations. Representatives from industry, labor, health and safety experts, advocacy groups, representatives from academia, and government agencies participated and provided input. In addition, Cal/OSHA presented multiple discussion drafts, provided opportunity for stakeholder comments, and solicited alternatives to the proposed regulation.

The Board considered two regulatory alternatives, a less stringent alternative and a more stringent alternative.

Alternative #1 would eliminate from the proposed regulation subsection (e), which mandates additional compliance actions related to assessment and control measures when the temperature or heat index equals or exceeds the specified regulatory threshold. Removal of these requirements would make the indoor heat illness prevention requirements generally more consistent with the requirements in section 3395—the outdoor heat standard.

²⁹ The full text of the SRIA is available at <https://dof.ca.gov/wp-content/uploads/sites/352/Forecasting/Economics/Documents/Indoor-Heat-Illness-Prevention-SRIA.pdf>

Specifically, it would remove the requirement to adopt engineering controls or other control measures, where feasible, in indoor workplaces with higher risk of heat illnesses. The less stringent alternative would not require employers to evaluate heat risk and attempt to reduce the temperature or heat index in indoor places of employers. Instead, it would rely primarily on other practices recommended by federal OSHA, NIOSH, and other organizations, including providing access to water, cool-down areas, emergency response procedures, observation during acclimatization, training on safety procedures and identifying signs and symptoms of heat illness, and developing a HIPP.

The Board rejected Alternative #1 because it is less likely to effectively prevent or reduce heat-related illness relative to the proposed regulatory action. Specifically, the engineering controls included in subsection (e)(2) represent the most effective method to reduce temperatures and heat illness in indoor places of employment. Furthermore, the less stringent alternative may not yield the level of productivity benefits estimated under the proposed regulation, while it would still require potentially costly administrative actions to comply with the other requirements. Therefore, the less stringent alternative would be less cost-effective than the proposed regulation, the number of cases of heat-related illness would remain higher, and the overall benefits would be significantly lower.

Alternative #2 would require employers under subsection (e)(1) to use a wet bulb globe temperature (WBGT) device to measure the temperature, relative humidity, air velocity, and radiant heat and record these measurements when the temperature is expected to be 10 degrees or more above previous measurements. The WBGT is the most frequently used measure of heat stress and is recommended for use throughout the world. WBGT takes into account temperature, relative humidity, wind speed, and radiant heat. In comparison, heat index only takes into consideration temperature and humidity. The device is slightly more expensive than a basic digital thermometer, and measurements, including the calculation of the WBGT, are relatively easy to make. The potential benefits of using a WBGT device include more accurate measurement of heat stress and improved ability to adopt specific recommendations based on the WBGT.

The Board rejected Alternative #2 because it imposes significant costs on small businesses and the additional benefits of using a WBGT device are not likely to significantly exceed the benefits of adopting engineering controls in indoor places of employment or reducing heat stress through other preventative measures, such as administrative controls. The WBGT device is more costly than a digital thermometer and relative humidity gauge and using the WBGT would require more time to take a reading as well as training in how to properly use the device. Furthermore, under the proposed regulation, in lieu of complying with subsection (e)(1), an employer may simply assume a work area is subject to the compliance actions in subsection (e)(2) that are required when the temperature or heat index exceeds one of the regulatory thresholds. In this case the employer would still have to comply with subsection (e)(2). The use

of a WBGT device in and of itself is not likely to generate extra compliance actions that will result in additional health or productivity impacts.