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## **INITIAL STATEMENT OF REASONS**

### CALIFORNIA CODE OF REGULATIONS

TITLE 8: New Section 5141.1 of the General Industry Safety Orders

### **Protection from Wildfire Smoke**

### **SPECIFIC PURPOSE AND FACTUAL BASIS OF PROPOSED ACTION**

This rulemaking was originally initiated in response to Petition File Number 573 submitted on December 10, 2018 by Mitch Steiger, California Labor Federation; Douglas Parker, Worksafe; and Anne Katten, California Rural Legal Foundation. The petitioners requested emergency rulemaking to protect employees from the harmful effects of wildfire smoke. The Board voted to grant the petition in part, and requested that the Division of Occupational Safety and Health (Division) draft an emergency rulemaking proposal. The resulting emergency regulation was approved by the Occupational Safety and Health Standards Board (Board) on July 18, 2019 and became effective on July 29, 2019.

Wildfires in California became dramatically worse in 2018, causing deaths and economic damage that dwarfed previous years. The catastrophic Camp Fire was the deadliest and most destructive wildfire in state history, killing 86 people and destroying 18,804 structures. On January 8, 2019, Governor Gavin Newsom issued Executive Order N-05-19, declaring that 2018 was the most destructive fire season in California history, with over 7,600 wildfires burning across 1,846,445 acres. The Order states that "...the reality of climate change – persistent drought, warmer temperatures and more severe winds – has created conditions that will lead to more frequent and destructive wildfires."<sup>1</sup>

Consistent with the Governor's Order, research conducted by the U.S. Environmental Protection Agency (U.S. EPA) found that fires are increasing in frequency, size and intensity, creating the potential for greater smoke production and chronic smoke exposures in the United States, particularly in the West.<sup>2</sup> This suggests that the 2018 wildfires were not merely an aberration, and that state agencies should be prepared for a high likelihood of widespread exposure to wildfire smoke in 2019 and beyond. On March 22, 2019, Governor Newsom acknowledged the danger posed by the 2019 wildfire season, proclaiming a state of emergency in California "due to

<sup>1</sup> [Gavin Newsom, Governor of California, Executive Order N-05-19](https://www.gov.ca.gov/wp-content/uploads/2019/01/1.8.19-EO-N-05-19.pdf). <https://www.gov.ca.gov/wp-content/uploads/2019/01/1.8.19-EO-N-05-19.pdf>

<sup>2</sup> United States Environment Protection Agency (U.S. EPA); [Website Wildland Fire Research to Protect Health and the Environment](https://www.epa.gov/air-research/wildland-fire-research-protect-health-and-environment). <https://www.epa.gov/air-research/wildland-fire-research-protect-health-and-environment>; and U.S. EPA. Website accessed 1-7-2019. [Wildland Fire Research: Health Effects Research](https://www.epa.gov/air-research/wildland-fire-research-health-effects-research). <https://www.epa.gov/air-research/wildland-fire-research-health-effects-research>

a vast tree die-off” which “has contributed to worsening forest conditions, creating extremely dangerous fire risk...”<sup>3</sup>

While thousands of chemical compounds are present in wildfire smoke, the principal harmful pollutant of concern for persons not in close proximity to the flames is particulate matter with an aerodynamic diameter of 2.5 micrometers or smaller, known as PM<sub>2.5</sub>. Airborne particle size is directly linked to the potential for causing health risks. Small particles less than 2.5 micrometers in diameter pose the greatest risk because they penetrate deep into the lungs and can enter the bloodstream.<sup>4</sup> These health effects of PM<sub>2.5</sub> include eye irritation, respiratory tract irritation, cough, difficulty breathing, reduced lung function, bronchitis, exacerbation of asthma, heart failure, premature death, increased local lung and systemic inflammation, acute and chronic cardiovascular effects, and acute and chronic respiratory effects.<sup>5</sup> Adding to the risk, toxic organic compounds and metals can be adsorbed by airborne PM<sub>2.5</sub>.<sup>6</sup>

The National Oceanic and Atmospheric Administration (NOAA) determined that wildfire smoke can spread thousands of miles from its source, affecting communities near and far.<sup>7</sup> Winds also alter the dispersion pattern of smoke.<sup>8</sup>

Occupational safety and health standards within Title 8 of the California Code of Regulations protect workers from harmful respiratory hazards in general, but there is currently no regulation that specifically addresses either PM<sub>2.5</sub> or wildfire smoke. The primary measurement of air

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<sup>3</sup> Gavin Newsom, Governor of California; [Proclamation of a State of Emergency](#); March 22, 2019. <https://www.gov.ca.gov/wp-content/uploads/2019/03/03.22.19-State-of-Emergency-Attested.pdf>

<sup>4</sup> U.S. EPA; [Health and Environmental Effects of Particulate Matter \(PM\)](#). <https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm>

<sup>5</sup> U.S. EPA; U.S. Forest Service; U.S. Centers for Disease Control and Prevention; California Air Resources Board; Wildfire Smoke - [A Guide for Public Health Officials](#); pages 4-7; August 2019. <https://www3.epa.gov/airnow/wildfire-smoke/wildfire-smoke-guide-revised-2019.pdf>

California Air Resources Board; [Inhalable Particulate Matter and Health \(PM<sub>2.5</sub> and PM<sub>10</sub>\)](#) August 10, 2017. <https://ww3.arb.ca.gov/research/aaqs/common-pollutants/pm/pm.htm>

Reisen F, Durán S, Flannigan M, Elliot C, Rideout K; [Wildfire Smoke and Public Health Risk](#); International Journal of Wildland Fire; August 2015; 24, 1029-1044.

[https://www.researchgate.net/publication/281035322\\_Wildfire\\_smoke\\_and\\_public\\_health\\_risk](https://www.researchgate.net/publication/281035322_Wildfire_smoke_and_public_health_risk)

Health Effects Institute; State of Global Air/2018: [A Special Report on Global Exposure to Air Pollution and Its Disease Burden: Special Report](#); Boston, MA; Health Effects Institute.

<https://www.stateofglobalair.org/sites/default/files/soga-2018-report.pdf>

<sup>6</sup> Zhang HH, Li Z, Liu Y, et al; [Physical and chemical characteristics of PM<sub>2.5</sub> and its toxicity to human bronchial cells BEAS-2B in the winter and summer](#); Journal of Zhejiang University-Science B (Biomedicine and Biotechnology); 2018;19(4):317–326; <https://doi.org/10.1631/jzus.B1700123>. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5964345/pdf/JZUSB19-0317.pdf>

<sup>7</sup> [National Oceanic and Atmospheric Administration Twitter](#).

<https://twitter.com/noaasatellites/status/1032311533668319232?lang=en>

National Oceanic and Atmospheric Administration; [Satellite and Information Service](#). Website accessed 1-9-2019.

<https://www.nesdis.noaa.gov/content/amtrak-relies-new-noaa-satellite-smoke-data-protect-passengers-during-dangerous-california>

Navarro KM; [Assessment of Ambient and Occupational Exposures to Air Contaminants from Wildland Fire Smoke](#); Dissertation; Fall 2016; University of California, Berkeley, California.

[http://digitalassets.lib.berkeley.edu/etd/ucb/text/Navarro\\_berkeley\\_0028E\\_16683.pdf](http://digitalassets.lib.berkeley.edu/etd/ucb/text/Navarro_berkeley_0028E_16683.pdf)

<sup>8</sup> [Smoke Management Guidelines for Prescribed Burning in the Southeast, Smoke Dispersion](#).

[http://www.auburn.edu/academic/forestry\\_wildlife/fire/smoke\\_guide/smoke\\_dispersion.htm](http://www.auburn.edu/academic/forestry_wildlife/fire/smoke_guide/smoke_dispersion.htm)

quality is the Air Quality Index (AQI),<sup>9</sup> but AQI standards are not mentioned anywhere in Title 8. Without a specific reference to either PM2.5 or wildfire smoke, the existing regulations rely on employers to determine whether a given exposure is “harmful” and whether respirators are “necessary to protect the health of the employee.” (Cal. Code Regs., tit. 8, §§ 5141, 5144.) Based on the calls received by the Division during the height of recent wildfires, a significant number of employers were uncertain about what protective measures to use or when to use them. Many of these businesses had no previous experience with wildfire smoke until the last two years. Without specific regulatory guidance, these employers were confused about how to evaluate and respond to this hazard.

This confusion also causes the Division to expend staff resources in order to respond to questions that would be answered by Title 8, new section 5141.1.

The Board is proposing this regulation, Title 8, new section 5141.1, to preserve worker safety and health and to clarify employers’ existing obligations, making compliance easier, simpler, and more straightforward.

Current regulations are not sufficiently specific as to what employers are required to do during wildfire events. This results in confusion on behalf of both employers and employees, leaving many employees unprotected. The proposed regulation, Protection from Wildfire Smoke, Title 8, new section 5141.1 will provide clarity to employers so that they may better protect employees from the toxic and harmful effects of wildfire smoke.

### **New Section 5141.1. Protection from Wildfire Smoke.**

This proposed standard, new section 5141.1, would be in Article 107, Dusts, Fumes, Mists, Vapors and Gases, directly after section 5141, Control of Harmful Exposure to Employees. The regulation would include the following specific requirements.

#### **New Section 5141.1(a). Scope.**

This proposed subsection (a)(1) establishes the application of the proposed regulation to all workplaces where the current Air Quality Index (AQI) for PM2.5 is 151 or greater and the employer should reasonably anticipate that employees may be exposed to wildfire smoke.

The subsection is necessary to establish the conditions in which employers will be required to comply with the proposed regulation and to take action to protect employees from the harmful effects of wildfire smoke.

Proposed subsection (a)(2) sets forth exceptions to the application of the regulation. Petition 573 sought protection from wildfire smoke for outdoor workers in particular, and the scope of

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<sup>9</sup> Electronic Code of Federal Regulations; [Title 40, Protection of Environment; Part 58, Ambient Air Quality Surveillance; Appendix G, Uniform Air Quality Index \(AQI\) and Daily Reporting](#); February 19, 2020. [https://gov.ecfr.io/cgi-bin/text-idx?SID=455b88cb0ce9e587f8162e9eb0b2bece&mc=true&node=ap40.6.58.0000\\_0nbspnbspnbsp.g&rgn=div9](https://gov.ecfr.io/cgi-bin/text-idx?SID=455b88cb0ce9e587f8162e9eb0b2bece&mc=true&node=ap40.6.58.0000_0nbspnbspnbsp.g&rgn=div9)

U.S. EPA; [Integrated Science Assessment for Particulate Matter](#); (Final Report, December 2009); Includes Errata Sheet Created on February 10, 2010; U.S. EPA, Washington, DC, EPA/600/R-08/139F, December 2009, Provided by Compact Disk. [https://cfpub.epa.gov/si/si\\_public\\_record\\_report.cfm?Lab=NCEA&dirEntryId=216546](https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NCEA&dirEntryId=216546)

proposed regulation limits its application to workers with direct, immediate exposure to outdoor air. This is accomplished by exempting enclosed and mechanically ventilated buildings and structures, as long as any windows, doors, bays, or other openings are kept closed, except when it is necessary to open doors for persons to enter or exit. Likewise, enclosed vehicles are exempted when the air is filtered by a cabin air filter and windows, doors, and other openings are kept closed when not using a door to enter or exit.

Workplaces are also exempt if the employer can demonstrate that the concentration of PM<sub>2.5</sub> in the air does not exceed a concentration that corresponds to a current AQI of 150. This is necessary to allow employers who choose to monitor the PM<sub>2.5</sub> level at their worksites rather than relying on the reported current AQI. Employers seeking this exemption would have to follow Appendix A, described below, to ensure the accuracy of their measurements.

This subsection also exempts employees exposed to a current AQI for PM<sub>2.5</sub> of 151 or greater for an hour or less during a shift, and firefighters engaged in wildland firefighting.

Proposed subsection (a)(3) makes it clear that employers within the scope of this regulation should comply with this section for the purpose of addressing the hazard of wildfire smoke resulting in a current AQI for PM<sub>2.5</sub> of 151 or higher, rather than referring to the more general requirements in the existing respiratory protections found in sections 5141 and 5155.

#### **New Section 5141.1(b). Definitions.**

This proposed subsection provides definitions for the terms “Current Air Quality Index (Current AQI),” “NIOSH,” “PM<sub>2.5</sub>,” and “Wildfire Smoke.”

The table listing the levels of health concerns for the AQI categories was sourced from [Title 40 Code of Federal Regulations, Part 58, Appendix G](https://gov.ecfr.io/cgi-bin/text-idx?SID=455b88cb0ce9e587f8162e9eb0b2bece&mc=true&node=ap40.6.58.0000_0nbspnbspnbsp.p.g&rgn=div9). [https://gov.ecfr.io/cgi-bin/text-idx?SID=455b88cb0ce9e587f8162e9eb0b2bece&mc=true&node=ap40.6.58.0000\\_0nbspnbspnbsp.p.g&rgn=div9](https://gov.ecfr.io/cgi-bin/text-idx?SID=455b88cb0ce9e587f8162e9eb0b2bece&mc=true&node=ap40.6.58.0000_0nbspnbspnbsp.p.g&rgn=div9)

The National Institute for Occupational Safety and Health (NIOSH) is a division of the federal Centers for Disease Control and Prevention (CDC) and is the recognized national expert on workplace safety and health research. NIOSH is the world’s preeminent occupational safety and health research organization who through the scientific method, develops the data that is often used to established occupational safety and health standards by the Federal Occupational Safety and Health Administration and other public entities charged with this responsibility. NIOSH tests, approves, and certifies respirators used in the workplace pursuant to [Title 42 Code of Federal Regulations Part 84](https://gov.ecfr.io/cgi-bin/retrieveECFR?gp=&SID=bc6a566fab760f99f57e382e3f16fac5&mc=true&n=pt42.1.84&r=PART&ty=HTML#se42.1.84_130). [https://gov.ecfr.io/cgi-bin/retrieveECFR?gp=&SID=bc6a566fab760f99f57e382e3f16fac5&mc=true&n=pt42.1.84&r=PART&ty=HTML#se42.1.84\\_130](https://gov.ecfr.io/cgi-bin/retrieveECFR?gp=&SID=bc6a566fab760f99f57e382e3f16fac5&mc=true&n=pt42.1.84&r=PART&ty=HTML#se42.1.84_130)

The subsection is necessary to clarify the application and meanings of terms used in the proposed regulation.

**New Section 5141.1(c). Identification of harmful exposures.**

This proposed subsection requires employers to obtain the current AQI for PM2.5 for their workplaces at the start of each shift and periodically thereafter, as needed to protect the health of employees. An employer may acquire this information by checking specified government agency websites, obtaining the current AQI for PM2.5 directly from listed government agencies, or by measuring the PM2.5 levels at the worksite. This subsection encourages compliance by listing reputable resources for employers to easily find AQI forecasts for current AQI for PM2.5, while allowing employers to also identify other effective methods that may be more suitable for their work environment.

The subsection is necessary to ensure that employers regularly check the AQI levels during wildfire events so they will be able to determine when protective measures are needed.

An exception is provided for employers who *assume* the AQI is over 500 and comply with subsection (f), control of harmful exposures to employees, using that assumption. This exception is included because there is no need for an employer to monitor the current AQI for PM2.5 if the employer is already complying with the maximum respiratory protection requirements of the regulation.

For the same reason, there is an exception for employers in an emergency subject to subsection (f)(4). If they *assume* an AQI of 151 or greater and comply with (f)(3)(A) using that assumption, there is no need to monitor the AQI because they are already providing the maximum protection required by the regulation in emergency situations.

**New Section 5141.1(d). Communication.**

The proposed subsection refers to section 3203, Injury and Illness Protection Program (IIPP), which requires employers establish a system for communicating wildfire smoke hazards with employees in a language and manner readily understandable by employees. This subsection clarifies the application of that requirement in the context of wildfire smoke. Under the proposed subsection, employers must communicate the current AQI for PM2.5 and related protective measures in a language and manner that employees can understand. The subsection also requires employers to encourage employees to inform their employer about worsening air quality or possible adverse symptoms of wildfire smoke exposure. This subsection identifies minimum items to be communicated to employees for compliance with the communication requirement of 5141.1, and guidelines for when employees should report to employers conditions that may indicate 5141.1 triggering events exist.

The subsection is necessary both to ensure employees receive accurate and timely information and to ensure the employer receives necessary feedback from employees at their work location.

**New Section 5141.1(e). Training and instruction.**

The proposed subsection refers to section 3203, Injury and Illness Protection Program (IIPP), which requires employers to provide effective training and instruction in a language easily

understood by employees. The training shall contain, at a minimum, the information contained in Appendix B, described below, and must be presented in a language and manner readily understandable by employees.

The subsection is necessary to ensure that employees understand various topics necessary to protect their health during wildfire events, including the hazards posed by wildfire smoke and the appropriate use of respirators.

**New Section 5141.1(f). Control of harmful exposures to employees.**

The proposed subsection requires employers to protect employees using the hierarchy of controls set forth in existing section 5141. In order of priority, these are: engineering controls, administrative controls, and control by respiratory protective equipment.

Proposed subsections (f)(1), (f)(2), and (f)(3) clarify the application of the hierarchy of controls to the specific context of wildfire smoke exposure.

Subsections (f)(1) and (f)(2) give examples of engineering and administrative controls that may reduce employees' exposure to PM<sub>2.5</sub> from wildfire smoke. Engineering controls should be used to the extent feasible and include providing enclosed structures or vehicles where the air is filtered. If engineering controls are not feasible, employers shall implement administrative controls, if practicable. Administrative controls can include relocating work, changing work schedules, reducing work intensity, or providing additional breaks. Proposed subsections 5141.1(f)(1) and (f)(2) are similar to existing subsections 5141(a) and (b).

Subsections (f)(1) and (f)(2) are necessary to clarify for employers that engineering and administrative controls (already required in existing section 5141) are appropriate to reduce employees' exposure to PM<sub>2.5</sub> from wildfire smoke.

Subsection (f)(3)(A) mandates that employers provide a sufficient number of respirators consistent with Title 8, section 5144 for employees' voluntary use when the current AQI for PM<sub>2.5</sub> is 151 or greater, but not exceeding 500. Subsection (f)(3)(A) specifically states that N95 filtering facepiece respirators are appropriate for these conditions and provides requirements for the selection, maintenance, and replacement of respirators. It also explains that employers shall provide training about respirator use in accordance with section 5141.1 Appendix B rather than section 5144 Appendix D.

This subsection is necessary because it provides clarity for those employers who may be uncertain about what type of respiratory protection is appropriate for wildfire smoke.

Under section 5144(c)(2), if respirators are provided but not required, employers may give filtering facepiece respirators such as N95s to their workers without completing medical evaluations or fit testing as required under section 5144(c)(1) when respirator use is mandatory. A Note to the proposed subsection (f)(3)(A) ensures that employers understand this.

Under the proposed subsection (f)(3)(B), respirator use would be required when the AQI for PM<sub>2.5</sub> exceeds 500. The U.S. EPA AirNow program has occasionally published AQI levels

above 500 within California, but that occurs so rarely that the EPA's AQI categories, depicted in the chart in proposed subsection (b), only go up to 500.

This subsection is necessary to address conditions that are so infrequent, and pose such a serious potential health risk, that more protective measures are necessary. Subsection (f)(3)(B) also states that respirators provided for mandatory use should have an assigned protection factor in accordance with section 5144. The existing section 5144 provides a method for employers to determine which respirators will reduce the current AQI for PM<sub>2.5</sub> within the respirator to 151 or less.

Proposed subsection (f)(4) states that only voluntary respiratory protection per subsection (f)(3)(A) is required during emergencies, including rescue and evacuation, for all AQI levels of 151 or above. Emergencies include utilities, communications, and medical operations, when they are directly aiding firefighting or emergency operations.

This subsection is necessary to allow employers and workers responding to an emergency to act quickly, without evaluating the possible application of engineering or administrative controls, and without performing medical evaluations and fit testing for mandatory respirator use. Under this subsection, respirators for voluntary use can be provided quickly and easily to emergency personnel and other employees directly assisting emergency response.

**New Appendix A to New Section 5141.1: Measuring PM<sub>2.5</sub> Levels at the Worksite (Mandatory if an Employer Monitors with a Direct Reading Instrument)**

This appendix sets forth the requirements for measuring the PM<sub>2.5</sub> levels using a direct-reading particulate monitor for employers who elect this option to determine PM<sub>2.5</sub> levels. The appendix also states how such measurements can be used to determine the equivalent current AQI for the purposes of proposed section 5141.1, using a table adapted from Title 40 Code of Federal Regulations, Part 58, Appendix G, Table 2. The appendix also states that a person with the necessary training or experience shall conduct and evaluate the monitoring and the interpretation of the results, so that exposures are not underestimated.

This appendix is necessary to ensure that employers who elect to perform their own PM<sub>2.5</sub> monitoring do so using accurate equipment and methods.

**New Appendix B to New Section 5141.1: Information to Be Provided to Employees (Mandatory)**

The appendix provides information about the health effects of wildfire smoke, medical treatment, how to obtain the current AQI for PM2.5, the requirements of the proposed regulation, the employer's two-way communication system, employer's methods to protect employees from wildfire smoke, the benefits and limitations of respirators when exposed to wildfire smoke, and how to properly use and maintain employer provided respirators.

This appendix is necessary in order to assist employers with training regarding wildfire smoke hazards and to ensure that employees have information critical for protecting their health. Employers addressing the potential hazard of wildfire smoke for the first time may be uncertain about what training should be provided. This appendix provides a convenient method for ensuring that critical information is conveyed to employees, including the health effects of wildfire smoke, available protections, and the appropriate use of respirators. For ease of use, the appendix includes blank lines to allow employers to easily customize the information.

**REFERENCE TO COMPARABLE FEDERAL REGULATION**

Code of Federal Regulations, Title 29, section 1910.134 is similar to the existing respiratory protection regulation in California Code of Regulations, Title 8, section 5144.

Code of Federal Regulations, Title 29, subsection 1910.1000(e) is similar to the existing regulation to control harmful exposures to employees in California Code of Regulations, Title 8, section 5141.

No federal law or regulation exists or has been promulgated that specifically addresses occupational exposure to either wildfire smoke or PM2.5.

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

The Board has relied upon the following documents as part of this rulemaking action:

1. Gavin Newsom, Governor of California, [Executive Order N-05-19](https://www.gov.ca.gov/wp-content/uploads/2019/01/1.8.19-EO-N-05-19.pdf). January 8, 2019.  
<https://www.gov.ca.gov/wp-content/uploads/2019/01/1.8.19-EO-N-05-19.pdf>
2. Gavin Newsom, Governor of California; [Proclamation of a State of Emergency](https://www.gov.ca.gov/wp-content/uploads/2019/03/03.22.19-State-of-Emergency-Attested.pdf). March 22, 2019.  
<https://www.gov.ca.gov/wp-content/uploads/2019/03/03.22.19-State-of-Emergency-Attested.pdf>
3. [Petition No. 573](https://www.dir.ca.gov/oshsb/documents/petition-573.pdf), submitted by Mitch Steiger, California Labor Federation; Douglas Parker, Worksafe; and Anne Katten, California Rural Legal Assistance Foundation, dated December 10, 2018.  
<https://www.dir.ca.gov/oshsb/documents/petition-573.pdf>  
and



- Occupational Safety and Health Standards Board; [Petition 573; Adopted Decision](#); March 21, 2019.  
<https://www.dir.ca.gov/oshsb/documents/petition-573-adopteddecision.pdf>
4. [Division of Occupational Safety and Health's Evaluation of Petition 573](#); February 8, 2019.  
<https://www.dir.ca.gov/oshsb/documents/petition-573-dosheval.pdf>
  5. United States Environmental Protection Agency (U.S. EPA); Website [Wildland Fire Research to Protect Health and the Environment](#).  
<https://www.epa.gov/air-research/wildland-fire-research-protect-health-and-environment>
  6. U.S. EPA; Website accessed January 7, 2019; [Wildland Fire Research: Health Effects Research](#); Last updated on June 4, 2019.  
<https://www.epa.gov/air-research/wildland-fire-research-health-effects-research>
  7. U.S. EPA; U.S. Forest Service; U.S. Centers for Disease Control and Prevention; California Air Resources Board; [Wildfire Smoke - A Guide for Public Health Officials](#); pages 4-7; August 2019. <https://www3.epa.gov/airnow/wildfire-smoke/wildfire-smoke-guide-revised-2019.pdf>.
  8. [National Oceanic and Atmospheric Administration Twitter](#).  
<https://twitter.com/noaasatellites/status/1032311533668319232?lang=en>
  9. National Oceanic and Atmospheric Administration; Satellite and Information Service; [AMTRAK Relies on New NOAA Satellite Smoke Data to Protect Passengers During Dangerous California Wildfires](#); Website accessed 1-9-2019.  
<https://www.nesdis.noaa.gov/content/amtrak-relies-new-noaa-satellite-smoke-data-protect-passengers-during-dangerous-california>
  10. Navarro KM; [Assessment of Ambient and Occupational Exposures to Air Contaminants from Wildland Fire Smoke](#); Dissertation; Fall 2016; University of California, Berkeley, California.  
[http://digitalassets.lib.berkeley.edu/etd/ucb/text/Navarro\\_berkeley\\_0028E\\_16683.pdf](http://digitalassets.lib.berkeley.edu/etd/ucb/text/Navarro_berkeley_0028E_16683.pdf)
  11. [Smoke Management Guidelines for Prescribed Burning in the Southeast, Smoke Dispersion](#).  
[http://www.auburn.edu/academic/forestry\\_wildlife/fire/smoke\\_guide/](http://www.auburn.edu/academic/forestry_wildlife/fire/smoke_guide/) and  
[http://www.auburn.edu/academic/forestry\\_wildlife/fire/smoke\\_guide/smoke\\_dispersion.htm](http://www.auburn.edu/academic/forestry_wildlife/fire/smoke_guide/smoke_dispersion.htm)
  12. California Air Resources Board; [Inhalable Particulate Matter and Health \(PM2.5 and PM10\)](#) August 10, 2017.  
<https://ww3.arb.ca.gov/research/aaqs/common-pollutants/pm/pm.htm>
  13. U.S. EPA; [Health and Environmental Effects of Particulate Matter \(PM\)](#); June 20, 2018.  
<https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm>
  14. Reid CE, Brauer M, Johnston FH, Jerrett M, Balmes JR, Elliot CT; [Critical Review of Health Impacts of Wildfire Smoke Exposure](#); Environmental Health Perspectives; September 2016; 124(9); Pages 1334 - 1343.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5010409/pdf/ehp.1409277.pdf>
  15. Wettstein Z, Hoshiko S, Fahimi J, Harrison R, Cascio W, Rappold A; [Cardiovascular and Cerebrovascular Emergency Department Visits Associated With Wildfire Smoke Exposure in California in 2015](#); Journal of the American Heart Association; April 17, 2018;7(8):e007492; Published online April 11, 2018; doi:10.1161/JAHA.117.007492.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6015400/>
  16. Delfino R, Brummel S, Wu J, Stern H, Ostro B, et al; [The relationship of respiratory and cardiovascular hospital admissions to the southern California wildfires of 2003](#); Occupational

- and Environmental Medicine; March 2009; 66(3): 189-197; Published online November 18, 2008; doi:10.1136/oem.2008.041376.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4176821/>
17. Hutchinson J, Vargo J, Milet M, French N, Billmire M, Johnson J, Hoshiko S; [The San Diego 2007 wildfires and Medi-Cal emergency department presentations, inpatient hospitalizations, and outpatient visits: An observational study of smoke exposure periods and a bidirectional case-crossover analysis](#); PLOS Medicine; July 10, 2018; 1002601; Pages 1 – 14. <https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1002601>
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These documents are available for review 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.

### **PETITION**

Petitioner: Mitch Steiger, California Labor Federation.  
Doug Parker, Worksafe  
Anne Katten, California Rural Legal Assistance Foundation

File No.: 573.

The Occupational Safety and Health Standards Board received a petition on December 13, 2018 (submitted December 10, 2018) to add an emergency provision to the safety orders contained in Title 8 of the California Code of Regulations to protect outdoor employees from the harmful effects of wildfire smoke. On March 21, 2019, the Occupational Safety and Health Standards Board granted the petition in part as follows:

- The Board finds specific grounds for considering exposure of outdoor workers to wildfire smoke events to constitute the basis for an emergency regulation. Therefore, the Board requests the Division to draft an emergency rulemaking proposal for consideration no later than the July Board meeting. The Board further instructs Board staff to work with the Division to develop a timeline to ensure that the proposal will be ready for consideration and adoption at that meeting.
- The Board also request that the Division convene an advisory committee process to develop a permanent regulation regarding control of exposure of employees to hazardous levels of wildfire smoke. Experts from the California Department of Public Health, Cal/EPA, CAL FIRE and other state and local government agencies, as well as labor and management representatives should be invited to participate.
- The Division held advisory meetings and reviewed stakeholder input in composing and modifying the text of the emergency regulation and the certificate of compliance.<sup>10</sup>

A copy of the petition, the Division’s evaluation, and the Board’s petition decision are included as Documents Relied Upon.

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<sup>10</sup> [May 8, 2019 Transcript of Cal/OSHA Advisory Meeting, Protection of Workers from Wildfire Smoke](https://www.dir.ca.gov/dosh/doshreg/Protection-from-Wildfire-Smoke/Meeting-Transcript.pdf); Clark Reporting and Video Conferencing, 2140 Shattuck Avenue, Suite 407, Berkeley, California 94704.

<https://www.dir.ca.gov/dosh/doshreg/Protection-from-Wildfire-Smoke/Meeting-Transcript.pdf>

[June 20, 2019 Transcript of Public Meeting/Public Hearing/Business Meeting of the Occupational Safety and Health Standards Board Regarding Discussion of Draft Protection from Wildfire Smoke \(Emergency\) Regulations to be Considered for Adoption at the July 18, 2019 Business Meeting](https://www.dir.ca.gov/dosh/doshreg/Protection-from-Wildfire-Smoke/Meeting-Transcript.pdf), Reported by Noelle C. Krawiec, CSR No. 14255, Job No. 32422.

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## **ADVISORY COMMITTEE**

This proposal was developed with the assistance of an advisory committee. (A copy of the May 8, 2019 transcript is included as a Document Relied Upon.)

## **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.

## **SPECIFIC TECHNOLOGY OR EQUIPMENT**

This proposal requires, under certain specified conditions, that employers must provide NIOSH approved respirators that effectively protect the wearers from inhalation of PM2.5, if the employer is unable to reduce employees' exposure sufficient through other means (for instance, relocating work away from wildfires smoke or into ventilated buildings, or postponing tasks until the smoke clears).

Providing such respirators under the conditions covered by this proposed regulation is already required by existing law in Title 8 sections 5141 and 5144, and Labor Code sections 6400, 6401, 6402, 6403, and 6404.

Existing law, Title 8, section 5140, "Definitions," states that a "harmful exposure" is an "exposure to dusts, fumes, mists, vapors, or gases" which is either "(a) In excess of any permissible limit prescribed by section 5155; or (b) Of such a nature by inhalation as to result in, or have a probability to result in, injury, illness, disease, impairment, or loss of function." No permissible limit for PM2.5 is prescribed by section 5155, and no existing Title 8 regulation specifies when wildfire smoke may result in injury, illness, disease, impairment, or loss of function.

Existing law, Title 8, section 5141, "Control of Harmful Exposures to Employees," lists the hierarchy of controls that employers must follow to address employee exposure to harmful air contaminants. Employers must first rely on engineering controls whenever feasible, but if engineering controls are not feasible or do not achieve full compliance, administrative controls must be implemented "if practicable." When engineering and administrative controls fail to achieve full compliance, then respiratory protective equipment shall be used.

Existing law, Title 8, section 5144, "Respiratory Protection," establishes that respirators "applicable and suitable for the purpose intended" must be provided "when such equipment is necessary to protect the health of the employee." To determine when respiratory equipment is necessary, section 5144 requires employers to "identify and evaluate the respiratory hazard(s) in the workplace" and "include a reasonable estimate of employee exposures to respiratory hazard(s) and an identification of the contaminant's chemical state and physical form." Section 5144 sets forth the requirements for respiratory protection programs, how appropriate respirators

should be selected, and related matters. This regulation does not expressly state the protection necessary for wildfire events, the concentration of PM<sub>2.5</sub> necessitating respiratory protection, nor does it expressly identify a type of respirator providing at least minimally effective filtration of PM<sub>2.5</sub> from wildfire smoke exposure, or make specifically clear what circumstances and conditions in which voluntary use of such respirators could occur in permissible accord with existing Title 8 respiratory protection requirements.

Existing law, Title 8, section 5155, “Airborne Contaminants,” sets permissible exposure limits for particular substances. No permissible exposure limit is listed for either wildfire smoke or PM<sub>2.5</sub>.

Labor Code section 6400 requires every employer to furnish employment and place of employment that is safe and healthful for its employees.

Labor Code section 6401 requires employers to furnish and use safety devices and safeguards which are reasonably adequate to render employment and place of employment safe and healthful and to do every other thing reasonably necessary to protect the life, safety, and health of employees.

Labor Code section 6402 prohibits employers from requiring or permitting any employee to go or be in an employment or place of employment which is not safe and healthful.

Labor Code section 6403 prohibits employers from failing to or neglecting to provide and use safety devices and safeguard reasonably adequate to render the employment and place of employment safe.

Labor Code section 6404 prohibits employers from occupying or maintaining any place of employment that is not safe and healthful.

However, existing law and regulations do not *expressly* address the hazard of PM<sub>2.5</sub> from wildfire smoke, leading to confusion about the appropriate respiratory protection and noncompliance. This regulation, therefore, clarifies the particular type of respirators that fulfill existing requirements in that specific context. The proposed regulation requires respirators approved by NIOSH for PM<sub>2.5</sub>, because without NIOSH certification there is no guarantee that the respirator has been tested and evaluated appropriately. Likewise, the respiratory must effectively protect the user from inhalation of PM<sub>2.5</sub>—surgical masks, for instance, provide no protection. A performance standard such as those included in existing law would not have provided clarity to employers and employees about the type of respirators adequate for protection from PM<sub>2.5</sub>.

Although the regulation states that an N95 filtering facepiece respirator meets this standard, that particular respirator is not mandated. Although N95s are particularly accessible and inexpensive, there are other methods of respiratory protection that protect against PM<sub>2.5</sub> and which would be permissible under the proposed regulation.

The other piece of equipment included in the proposed regulation, direct-reading particulate monitors, are also not mandated. Employers may choose to use such monitors in lieu of relying on AQI from specified government sources.

### **ECONOMIC IMPACT ANALYSIS/ASSESSMENT**

The proposed regulation will not have any effect on the creation or elimination of California jobs or the creation or elimination of California businesses or affect the expansion of existing California businesses.

The annual cost of the proposal for a typical business is very low, and there is no cost to private individuals who are not employers. In addition, many California businesses affected by this regulation are already prepared to provide N95 respirators and related training to employees in the event of wildfire smoke exposure, in compliance with existing Title 8 sections.

A small business is expected to incur a cost of \$150.74 in the first year, and in every year thereafter, to comply with the respirator and training requirements described above. A typical business is expected to incur a cost of \$191.19 in the first year, and in every year thereafter.

This has been calculated using data from the Employment Development Department (EDD) about the average number of employees per business in California (17,624,394 employees / 1,584,626 businesses) and the average number of employees per small business (13,886,430 employees / 1,581,846 businesses), and then applying the per-employee costs (\$17.19) described in detail below.<sup>11</sup>

The number of businesses affected by wildfire smoke will vary greatly from year to year. Many workplaces are exempt from the proposal, including buildings and vehicles with air filtration, along with workers who are exposed to outdoor air for less than an hour per shift (for instance, while traveling between buildings or walking to or from a vehicle).

The Division of Occupational Safety and Health (Division) estimated the number of private employers and employees that may be subject to this regulation in a given year by:

1. Estimating the total number of employers that could *possibly* be covered by the proposal, even for single day or fraction of a day. This is an estimate of all employers in California with employees who work outdoors—or in buildings, structures, or vehicles that are either entirely unfiltered or open to the outside air, such as sheds—for more than one-hour per shift. This number is the “*maximum possible number of employers.*”

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<sup>11</sup> Table 2A and 2B, 2018 Q3 and Q4: [https://www.labormarketinfo.edd.ca.gov/LMID/Size\\_of\\_Business\\_Data\\_for\\_CA.html](https://www.labormarketinfo.edd.ca.gov/LMID/Size_of_Business_Data_for_CA.html)  
<https://www.labormarketinfo.edd.ca.gov/file/indsize/2A-18-3-FINAL.xlsx>  
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<https://www.labormarketinfo.edd.ca.gov/file/indsize/2B-18-4-FINAL.xlsx>

2. Estimating the total number of employees that could *possibly* be covered by the proposal, even for single day or fraction of a day (i.e. an estimate of Californians working outdoors or in unfiltered outdoor air for more than one-hour per shift.) This number is the “*maximum possible number of employees.*”
3. Determining the portion of employers or employees from the totals above that might be affected by wildfire smoke in a given year. These numbers are the “*number of possible employers per year*” and the “*number of possible employees per year.*”

The Division determined the total number of employers and employees in California for each industry sector, according to the North American Industry Classification System (NAICS) as applied by the Employment Development Department (EDD).<sup>12</sup> Even though no data exists to provide a specific number or proportion of employees engaged in outdoor work within California, separating employers and employees by industry using NAICS codes allowed the Division to estimate the people and businesses that could possibly be covered by the proposed regulation. The Division estimated the percentage of employees, for each industrial sector, who work outdoors or in structures/vehicles with unfiltered air on any given day. The Division based its assumptions on agency experience with the industries in question, including experience derived from onsite investigations and other enforcement activities, research, and consultation with employers.

Using this methodology, the Division compiled EDD data on the number of employers and employees for 34 industries, each one a 3- or 4-digit NAICS codes or, when used by EDD, a combination of codes.<sup>13</sup> For each category, based on the types of industry included in the code or codes, the Division estimated the percentage of employees for whom this regulation might possibly apply.

The total number of employers in the selected industries was 329,797. The total number of employees, adjusted to account for the percentage estimated to work outdoors or in outdoor, unfiltered air in each industry, was 2,399,318.

The Division then determined the number of potentially affected employees and employers which might be covered by the regulation in a given year. Using 2018 geographic and air quality data from the California Air Resources Board, the Division calculated that about  $\frac{1}{3}$  of the California population may be exposed to unhealthy levels of PM<sub>2.5</sub> from wildfire smoke for ten days over the course of a year, under a worst-case scenario.<sup>14</sup> The year 2018 was used because it was the most destructive wildfire season in California history with over 7,600 fires burning an

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<sup>12</sup> [Seasonally adjusted monthly average](https://www.labormarketinfo.edd.ca.gov/data/employment-by-industry.html) for Q3 2019, the last full quarter available at the time of this writing, available at <https://www.labormarketinfo.edd.ca.gov/data/employment-by-industry.html>  
[https://www.labormarketinfo.edd.ca.gov/file/indhist/cal\\$shws.xls](https://www.labormarketinfo.edd.ca.gov/file/indhist/cal$shws.xls)

<sup>13</sup> Table created by Division of Occupational Safety and Health containing NAICS codes selected, percentages applied, and results of calculations: “Determination of businesses and employees possibly covered by regulation, based on seasonally adjusted monthly average by industry, Q3 2019.” Form 399 Attachment for Certificate of Compliance of title 8 section 5141.1.

<sup>14</sup> [Proportion of the population exposed to a current Air Quality Index \(AQI\) of 151 or greater during the 2018 wildfires, and the number of days of exposure, based on queries](https://www.arb.ca.gov/aqmis2/aqdselect.php) made at: <https://www.arb.ca.gov/aqmis2/aqdselect.php>



area of 1,846,445 acres, the largest area of burned acreage ever recorded in a fire season according to the California Department of Forestry and Fire Protection.

**Number of possible employees and employers  
 covered per year, worst-case scenario**

	<b>Total maximum possible</b>	<b>Possible per year (Total * 1/3)</b>
<b>Number of employers</b>	329,797	109,932
<b>Number of employees</b>	2,399,318	799,773

Under existing regulations (sections 5141 and 5144), employers subject to the proposed regulation already have an obligation to protect workers from the hazards of PM2.5 from wildfire smoke as set forth in the proposed section 5141.1. Employers are already required to use engineering and administrative controls when appropriate (for instance by moving tasks indoors or delaying non-critical tasks until the smoke clears) and, when such controls are infeasible or insufficient, providing respiratory protective equipment in the form of respirators.

However, in addition to the performance standard above, the proposed regulation includes *prescriptive* elements, the costs of which have been quantified by the Division.

The proposed regulation explicitly states that N95 filtering face piece respirators are appropriate for protecting wearers from inhalation of PM2.5 due to wildfire smoke. The cost per N95 respirator was estimated by the Public Agency Safety Management Association (PASMA) to be approximately \$0.75 per mask.<sup>15</sup> This estimate was accepted as reasonable based on the Division’s own research. During the 2019 fire season, Division staff researched companies which N95 manufacturer 3M listed as authorized sellers of Model 8210, one of the most popular filtering facepiece respirators. The Division found five businesses selling those items at a cost between \$0.64 and \$0.81 per unit.<sup>16</sup>

The training required in Appendix B of the proposed regulation, plus the time required for distributing and donning N95 masks and communicating required information to employees, is estimated to take about 20 minutes to complete. Cost has been estimated based on average hourly earnings as reported by EDD.<sup>17</sup>

<sup>15</sup> [Economic Impact Analysis: Emergency Regulations for Wildfire Smoke](https://www.dir.ca.gov/dosh/doshreg/Protection-from-Wildfire-Smoke/Comments-2/PASMA.pdf); to Division of Occupational Safety and Health, Research and Standards Unit; from Public Agency Safety Management Association (PASMA); by letter dated May 13, 2019. <https://www.dir.ca.gov/dosh/doshreg/Protection-from-Wildfire-Smoke/Comments-2/PASMA.pdf>.

<sup>16</sup> These were Enviro-safety (\$0.64), USA Safety Supply (\$0.65), Fairmont Supply (\$0.77), Amazon (\$0.75), and Pack n Tape (\$0.81). Per unit price was based on a box of 20 units, except for Pack n Tape, which sold by the case (160 units). The Division also found two vendors listed by 3M which charged per unit costs of \$1.24 (Stauffer) and \$1.56 (Zoro), but those were so much higher than the other prices that they were considered outliers. Other retailers not listed by 3M charged prices above \$0.81 but significantly below Stauffer and Zoro. Prices checked on or shortly before October 1, 2019.

<sup>17</sup> [Statewide average wage in California for Q1 2019](https://www.labormarketinfo.edd.ca.gov/data/oes-employment-and-wages.html#OES), the most recent data available as of this writing, at <https://www.labormarketinfo.edd.ca.gov/data/oes-employment-and-wages.html#OES>  
[https://www.labormarketinfo.edd.ca.gov/file/occup\\$/oeswages/cal\\$oes2019.xls](https://www.labormarketinfo.edd.ca.gov/file/occup$/oeswages/cal$oes2019.xls)

The Division has estimated maximum costs below by assuming that *all* covered businesses will incur new costs by complying with this proposed regulation, even though many private employers already have respiratory protection programs in place to respond to wildfire smoke, especially utilities and large construction companies.

Likewise, in the midst of a wildfire smoke event, many employers covered by the regulation may shut down work entirely or suffer reduced productivity for reasons *unrelated to this regulation*, namely mandated evacuations, other direct fire risks, and blackouts. This will be especially true if utilities continue the practice of preemptive blackouts to the extent witnessed in 2019. The numbers below have not been reduced to account for the fact that employers covered by the regulation may cease or reduce work in smoky areas due to the fire itself or related circumstances, rather than the regulation itself.

**Private sector annual cost of proposal, worst-case scenario<sup>18</sup>**

Safety and Health Requirement in 5141.1	Total exposed employees	Cost per employee	Days of wildfire smoke exposure	Cost/year
N-95 Respirator	799,773	\$0.75	10	\$5,998,298
Training and use of respirators	799,773	\$9.69		\$7,749,800
<b>Total cost</b>				<b>\$13,748,098</b>

The total, statewide savings that would result from the proposed regulation cannot be quantified. The Board is not aware of a study that quantifies the effects of deaths/illnesses from *occupational wildfire smoke*-related PM2.5 as opposed to exposures to PM2.5 from other sources, such as dust and pollution, or non-occupational exposures. Despite that, there is ample evidence that reducing exposure to PM2.5 in general and wildfire smoke in particular will result in improved health for California employees and reduce the financial costs caused by medical care and lost workdays, costs which may be borne by employees, their families, employers, insurers, and public benefits programs.

To give some idea of the extent of the anticipated health benefits, a 2018 epidemiologic analysis examined increased emergency room visits in eight air basins in California from May 1 to Sept 30, 2015, a year in which over 800,000 acres burned.<sup>19</sup> The study determined that days with dense wildfire smoke had multiplied cardiovascular emergency room visits (all causes) by 1.08 and respiratory emergency room visits (all causes) by 1.09.<sup>20</sup>

Some of the prescriptive elements of proposed section 5141.1 would result in savings to employers. Existing section 5144(d)(1)(C) requires employers to “*evaluate the respiratory*

<sup>18</sup> See table above for the basis of this number of total employees exposed. As described above, [the number of days of exposure is based on queries regarding the 2018 fire season](https://www.arb.ca.gov/aqmis2/aqdselect.php) made at: <https://www.arb.ca.gov/aqmis2/aqdselect.php>

<sup>19</sup> Wettstein Z, Hoshiko S, Fahimi J, Harrison R, Cascio W, Rappold A; [Cardiovascular and Cerebrovascular Emergency Department Visits Associated With Wildfire Smoke Exposure in California in 2015](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6015400/); Journal of the American Heart Association; April 17, 2018;7(8):e007492; Published online April 11, 2018; doi:10.1161/JAHA.117.007492. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6015400/>

<sup>20</sup> “Dense” was defined using a lower AQI than the threshold used by the proposed regulation, but this is the best available evidence.

*hazard(s) in the workplace... includ[ing] a reasonable estimate of employee exposures to respiratory hazard(s) and an identification of the contaminant's chemical state and physical form.”* Given the large and varying number of respiratory hazards in wildfire smoke, the cost of complying with this subsection during unhealthy wildfire smoke conditions cannot be estimated: costs vary significantly between worksites depending on the local air conditions, the nature of the work, and the breadth of the employer’s existing respiratory protection program. But compliance with the existing regulation likely requires monitoring by an industrial hygienist for some public employers, in some circumstances, while the proposed regulation does not. Proposed section 5141.1 will therefore reduce costs by giving employers an easy and efficient method of evaluating the respiratory hazards resulting from wildfire smoke by using the AQI for PM2.5, without the need for any specialized knowledge.

The fact that the proposed regulation allows employers to provide N95s to workers in response to wildfire smoke without performing medical evaluation or fit testing may result in some marginal savings. The exact amount would depend on the number, location, extent, and length of wildfires and cannot be quantified. Furthermore, the degree to which employers could really take advantage of these potential savings is unknown, because such entities would presumably continue to provide medical evaluations/fit testing for that portion of their workforce which is required to use respiratory protection equipment as a part of regular job duties, regardless of the presence of wildfire smoke.

### **BENEFITS OF THE PROPOSED ACTION**

Exposure to PM2.5 poses serious risk of adverse health outcomes through multiple biological mechanisms. These adverse health effects include, but are not limited to increased local lung and systemic inflammation, acute and chronic cardiovascular effects, and acute and chronic respiratory effects.<sup>21</sup>

Numerous published scientific epidemiological studies have found an association between wildfire smoke and respiratory morbidity in general (for instance respiratory emergency visits, physicians visits, and declines in lung function among children), along with exacerbation of asthma and chronic obstructive pulmonary disease.<sup>22</sup> Epidemiological studies also show that short-term exposures to PM2.5 can cause stroke, heart failure, and arrhythmias, as well as myocardial ischemia and infarction.<sup>23</sup> Emergency room admissions for respiratory,

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<sup>21</sup> Navarro KM; [Assessment of Ambient and Occupational Exposures to Air Contaminants from Wildland Fire Smoke](#); Dissertation.; Fall 2016; University of California, Berkeley, California.

[http://digitalassets.lib.berkeley.edu/etd/ucb/text/Navarro\\_berkeley\\_0028E\\_16683.pdf](http://digitalassets.lib.berkeley.edu/etd/ucb/text/Navarro_berkeley_0028E_16683.pdf)

<sup>22</sup> Reid CE, Brauer M, Johnston FH, Jerrett M, Balmes JR, Elliot CT; Critical Review of Health Impacts of Wildfire Smoke Exposure; Environmental Health Perspectives; September 2016; 124(9); 1334 - 1343.

<sup>23</sup> Wettstein Z, Hoshiko S, Fahimi J, Harrison, R, Cascio W, Rappold A; [Cardiovascular and Cerebrovascular Emergency Department Visits Associated With Wildfire Smoke Exposure in California in 2015](#); Journal of the American Heart Association; April 17, 2018; 7(8):e007492; Published online April 11, 2018; doi:10.1161/JAHA.117.007492. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6015400/>

cardiovascular, and cerebrovascular illnesses increase during wildfire smoke incidents.<sup>24</sup> As wildfire seasons worsen, the proposed regulation will avoid a potential increase in debilitating and sometimes life-threatening illnesses faced by workers exposed to wildfire smoke.

Using the AQI for PM<sub>2.5</sub>—developed by the U.S. EPA and easily accessible online—would make it easier for employers to understand and comply with their existing obligation to protect workers from respiratory hazards caused by wildfire smoke. The proposed regulation also clarifies when employers must respond to a heightened risk of employee exposure to wildfire smoke—namely, when the AQI for PM<sub>2.5</sub> exceeds 150 (unhealthy for everyone). When it is not feasible for employers to eliminate workers’ exposure through engineering controls (e.g. enclosed structures with air filtration), administrative controls (e.g. shifted time or location of work), or a combination of both, then, the proposal makes clear, employers must make effective respirators available to employees. N95 masks are a commonly available type of respirator which provide effective protection, when used as directed, under suitable conditions.

By specifying when such respirators should be provided for voluntary use, under a simply evaluated metric (AQI), the proposed regulation is intended to provide employers with readily understandable parameters for such respirators’ permissible use in accordance with existing Title 8 respiratory protection standards. The proposed regulation also identifies (per its Appendix B) the basic elements of employee training essential to the appropriate use of such respirators. The regulation should therefore increase compliance among employers and correct respirator use among employees.

The proposed regulation also responds to the uniquely unpredictable nature of wildfire smoke, an issue which is not included in any existing regulation. Section 5144 of Title 8 primarily addresses mandatory respirator use requiring both medical evaluations and fit testing prior to use, which can be an unrealistic requirement in the context of wildfires, given the speed at which large areas can be covered with harmful smoke.

This regulation is expected to be neutral to and will provide neither a benefit nor a detriment to the state’s environment.

### **EVIDENCE SUPPORTING FINDING OF NO SIGNIFICANT STATEWIDE ADVERSE ECONOMIC IMPACT DIRECTLY AFFECTING BUSINESSES**

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.

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<sup>24</sup> Delfino R, Brummel S, Wu J, et al; [The relationship of respiratory and cardiovascular hospital admissions to the southern California wildfires of 2003](https://doi.org/10.1136/oem.2008.041376); Occupational and Environmental Medicine; March 2009; 66(3): 189-197; Published online November 18, 2008; doi:10.1136/oem.2008.041376. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4176821/> and Hutchinson J.A, Vargo, J, Milet M, French N, Billmire M, Johnson J, Hoshiko S; [The San Diego 2007 wildfires and Medi-Cal emergency department presentations, inpatient hospitalizations, and outpatient visits: An observational study of smoke exposure periods and a bidirectional case-crossover analysis](https://doi.org/10.1371/journal.pmed.1002601); July 10, 2018; PLOS Medicine; 15(7): e1002601; Pages 1 – 14. <https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1002601>

Employers that cannot feasibly move the time/location of a workplace task to reduce exposure to wildfire smoke below an AQI of 151 (or utilize other engineering or administrative controls) can rely on the N95 masks to comply with the proposed section. N95s are easily available and inexpensive. The annual cost of the proposal for a typical and representative business is very low (about \$191, as stated above). Only businesses with employees who work outdoors or in unfiltered air for more than an hour per day are even *potentially* covered by the regulation, and in a given year most such businesses will not actually experience workplace conditions necessitating respiratory controls. Appendix B, included in the regulation, provides a brief and efficient method of training employees on the hazard of wildfire smoke.

### **REASONABLE ALTERNATIVES TO THE PROPOSAL AND THE BOARD'S REASONS FOR REJECTING THOSE ALTERNATIVES**

The Board has considered the following alternatives:

**Alternative 1: No regulation** – Because the proposed regulation clarifies existing law rather than imposing new requirements, the Division could enforce existing regulations. The Division has authority under sections 3203, 5141, and 5144 to issue citations against employers which do not limit employees' exposure to PM2.5 from wildfire smoke, provide N95s in unhealthy wildfire smoke conditions, give employees appropriate training, etc. Employers would therefore incur costs similar to the proposed regulation. The lack of clarity in existing regulatory language, however, would likely result in added expense. Under existing section 5144(d)(1)(C), employers must identify and evaluate all respiratory hazards by identifying the contaminants' chemical states and physical forms; an evaluation which may require technical and medical expertise as wildfire smoke is a complex mixture of many harmful respiratory hazards. Though the exact cost would vary depending on the particular circumstances of each employer, and cannot be estimated, this alternative would certainly cost significantly more than the proposed regulation. Likewise, enforcement would be more difficult and costly for the Division under this alternative.

This alternative would result in economic benefits from improved employee health if compliance with the existing regulations were to increase significantly, but the monetary benefit cannot be quantified. The number of noncompliant employers in 2020 and afterwards would likely be higher under this alternative, since businesses have had difficulty understanding and applying existing regulatory language. Thus, the economic benefit would be significantly lower than under the proposed regulation.

For these reasons, the Board rejected this alternative, consistent with its decision to grant Petition No. 573.

**Alternative 2: Including workplaces in the scope of the regulation unless indoor air was filtered by particular means** – Petition No. 573 partially granted by the Board referred to outdoor workers. The proposed regulation addresses the issue of what work is "outdoor" for purposes of wildfire smoke by its limited scope. Only workers exposed to outdoor, unfiltered air are covered by the proposed regulation.

An alternative is to impose requirements on workplaces that are indoors or within vehicles, if the air is not filtered by a method that effectively removed PM2.5 from the air such as a HEPA or MERV 13 filter. This would broaden the regulation beyond the scope of the proposed language, which targets those workers most likely to be exposed to unhealthy levels of PM2.5 from wildfire smoke, i.e. people working outside or in locations with outdoor or *entirely* unfiltered air.

This alternative would lead to an unquantifiable decrease in employee exposure to PM2.5 and a concomitant decrease in related illnesses. The cost of this alternative would be significantly higher than the proposed section 5141.1, as it would apply to almost all employers in California, except for certain facilities which already have specialized air filtering, such as some medical buildings, building with sensitive equipment or products, and buildings that are required to meet enhanced indoor environmental air quality standards due to local ordinances. The costs of this alternative could vary dramatically, depending on the particular indoor air filtering methods required by regulation, and the degree to which employers would need to alter existing ventilation systems. Because these complexities would require significant time to consider, this alternative would not be a timely means of addressing Petition 573.

For those reasons, the Board has rejected this alternative at this time.