

**ATTORNEYS GENERAL OF NEW YORK, CALIFORNIA, MARYLAND,
MASSACHUSETTS, NEW JERSEY, AND PENNSYLVANIA**

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Via Federal e-Rulemaking Portal

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United States Department of Labor
200 Constitution Avenue NW
Washington, DC 20210

Re: Comments on Advance Notice of Proposed Rulemaking for Heat Injury
and Illness Prevention in Outdoor and Indoor Work Settings
Docket No. OSHA-2021-0009

The undersigned Attorneys General of New York, California, Maryland, Massachusetts, New Jersey, and Pennsylvania jointly submit these comments on the Occupational Safety and Health Administration's (OSHA) advance notice of proposed rulemaking, 86 Fed. Reg. 59,309 (Oct. 27, 2021). OSHA seeks information on the extent and nature of hazardous heat in the workplace, and the nature and effectiveness of interventions and controls to prevent heat-related injury and illness. Because of the immediacy of climate change, which is spurring more frequent and intense extreme heat events, and the growing risk of injury, illness, and death from occupational heat exposure, we urge OSHA to take swift action to implement national heat standards for outdoor and indoor workers pursuant to its authority under Section 6 of the Occupational Safety and Health Act, 29 U.S.C. § 655, incorporating the recommendations detailed below.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
FACTUAL BACKGROUND.....	6
I. Climate Change Is Spurring More Frequent and Intense Extreme Heat Events and Elevating Average Temperatures.....	6
II. Extreme Heat Has Substantial Public Health Impacts.....	10
III. Low-Income People and People of Color Suffer Disproportionately High Rates of Injury, Illness, and Death from Extreme Heat Exposure, Including in the Workplace.	13
IV. Millions of Vulnerable Workers in a Range of Industries Face Substantial Health Risks from Outdoor and Indoor Occupational Heat Exposure.	15
A. Agriculture, Forestry, Fishing, and Hunting Workers.....	18
B. Construction Workers.....	19
C. Postal and Delivery Services Workers	20
D. Transportation and Material Moving Industry Workers	21
E. Indoor Workers.....	22
V. While Some States Have Taken Steps to Protect Their Workers from Occupational Heat, Federal Standards Are Needed to Protect Millions of Vulnerable Workers Across the Nation.	23
A. California.....	24
B. Washington	26
C. Minnesota.....	28
D. Oregon	29
E. Other State Efforts	29
VI. Existing Standards, Protocols, and Guidance from Government Agencies and Industry Groups Provide a Framework for Federal OSHA Heat Stress Standards.....	32
A. Existing OSHA Regulations and Guidance	32
B. NIOSH Criteria for a Recommended Standard.....	36
C. Manufacturing and Industrial Labor Standards.....	39
D. U.S. Armed Forces Guidance.....	40
E. Emergency Response Standards	42
F. Sports Medicine Guidelines.....	43
RECOMMENDATIONS FOR NATIONAL HEAT STANDARDS.....	44
I. OSHA Should Set Quantifiable Heat Exposure Thresholds.....	44

II.	OSHA Should Require Employers to Implement Preventive Measures to Minimize the Risk of Occupational Heat-Related Illness.	46
A.	Acclimatization Plans	46
B.	Hydration	47
C.	Rest Breaks and Shade.....	47
D.	Personal Protective Equipment.....	48
E.	Indoor Ventilation and Air Circulation.....	48
F.	Heat Alert Plans	49
G.	Worker Training and Engagement	50
H.	Monitoring.....	50
III.	OSHA Should Require Employers to Keep Records of All Heat-Related Injuries and Illnesses in the Workplace and to Report Those Records to OSHA.....	51
IV.	OSHA Should Enhance Its Workplace Inspection Program.....	51
V.	OSHA Should Require Employers to Institute Measures to Protect Vulnerable Workers.....	52
	CONCLUSION.....	52

EXECUTIVE SUMMARY

Heat is the leading cause of weather-related mortality in the United States, even though nearly all heat-related deaths are preventable through outreach and intervention.¹ Over the past 35 years, heat has claimed more lives per year on average than flooding and hurricanes combined.² According to the Centers for Disease Control and Prevention (CDC), extreme heat kills over 700 people per year,³ but because heat exposure often exacerbates underlying medical conditions such as diabetes and heart disease, it is likely that many heat-related deaths go misdiagnosed or unrecognized.⁴ As climate change yields higher temperatures and humidity across the globe, the United States will almost certainly experience a long-term upward trend in heat-related illness and death. Moreover, extreme heat will amplify environmental justice and environmental racism concerns, as low-income communities and communities of color already suffer an elevated rate of mortality and morbidity from heat exposure.⁵

Exposure to extreme heat is especially dangerous for workers due to the combined effects of environmental temperature and metabolic stress. The Bureau of Labor Statistics cites heat as a contributing cause of death for at least 56 workplace fatalities in 2020 and 43 in 2019.⁶ OSHA acknowledges that the actual number of workplace injuries, illnesses, and fatalities likely is much higher because of underreporting by employers and employees.⁷ This underreporting results from, among other things, the difficulty in recognizing heat as a contributing factor to injury, illness, and death; existing reporting requirements, which do not require reporting if the injury or illness does not result in medical treatment or days away from work; and disincentives for employees and employers alike, including fear of

¹ *Climate Change Indicators: Heat-Related Deaths*, U.S. Env'tl. Protection Agency, <https://www.epa.gov/climate-indicators/climate-change-indicators-heat-related-deaths> (last updated Oct. 22, 2021).

² See *Weather Fatalities 2020*, Nat'l Weather Serv., <https://www.weather.gov/hazstat/> (last visited Jan. 23, 2022).

³ See Ambarish Vaidyanathan, Ctrs. for Disease Control & Prevention, 69 *Weekly* 729 (2020), <https://www.cdc.gov/disasters/extremeheat/index.html>.

⁴ *Extreme Heat*, Ctrs. for Disease Control & Prevention, (last updated June 30, 2021).

⁵ See John M. Balbus et al., U.S. Global Change Research Program, Ch. 14 Human Health (2018), <https://nca2018.globalchange.gov/chapter/14/>; see also *infra* Factual Background, Parts III & IV.

⁶ See *Fatal Occupational Injuries by Event, 2020*, U.S. Bureau of Labor Statistics, <https://www.bls.gov/charts/census-of-fatal-occupational-injuries/fatal-occupational-injuries-by-event-drilldown.htm> (last visited Jan. 25, 2022); *43 Work-Related Deaths due to Environmental Heat Exposure in 2019*, TED: The Economics Daily (Sept. 1, 2021), <https://www.bls.gov/opub/ted/2021/43-work-related-deaths-due-to-environmental-heat-exposure-in-2019.htm>.

⁷ See *Facility Inspection Data*, Occupational Safety & Health Admin., <https://www.osha.gov/fatalities> (last visited Jan. 23, 2022); 86 Fed. Reg. 59,309, 59,310–11 (Oct. 27, 2021).

lost wages, retaliation, and reputational harm.⁸ These disincentives are particularly acute for undocumented, migrant, or low-wage workers, who are often at the greatest risk of heat-related illness.⁹

While OSHA has not promulgated occupational heat standards, three states—California, Washington, and Minnesota—have implemented some form of protective heat standards for workers, demonstrating that such standards are feasible and effective.¹⁰ In addition, in the summer of 2021, Oregon instituted emergency heat standards for workers, and Colorado, Maryland, and Nevada have passed laws requiring state health and safety administrators to promulgate rules related to hazardous heat in the workplace.¹¹ Still more states have developed guidance for employers and employees to minimize the risk of heat-related illness. But without national heat standards, millions of outdoor and indoor workers across the country will remain vulnerable to illness and death from occupational heat exposure.

Accordingly, we urge OSHA to develop standards that set maximum heat exposure thresholds for both outdoor and indoor workers; require employers to implement robust preventive measures to mitigate heat-related risks to workers; enhance current reporting and recordkeeping requirements; and implement other safeguards for workers, such as increased worksite inspections, enhanced protections for vulnerable workers, and whistleblower protections. In establishing these standards, OSHA should consider state precedents and experiences, along with standards recommended by the National Institute for Occupational Safety and Health (NIOSH), the American Conference of Governmental Industrial Hygienists (ACGIH), the U.S. Armed Forces, industry groups, and medical professionals with expertise in occupational heat exposure. By adopting these recommendations, described in detail below, OSHA will fulfill its responsibilities under the Occupational Safety and Health Act and protect workers from the growing threats of injury, illness, and death from extreme heat.

⁸ 86 Fed. Reg. at 59,310–11.

⁹ *Id.* at 59,311.

¹⁰ *See* Factual Background Part V.

¹¹ *Id.*

FACTUAL BACKGROUND

I. Climate Change Is Spurring More Frequent and Intense Extreme Heat Events and Elevating Average Temperatures.

As the Intergovernmental Panel on Climate Change (IPCC) reported in 2021, it is virtually certain that hot temperature extremes, including heat waves, have become more frequent and more intense across the globe since the 1950s.¹² Even if we take steps to reduce global greenhouse gas emissions, because of accumulated greenhouse gases in the atmosphere, extreme heat will still worsen over the course of the century.¹³ In a high emissions scenario (termed “RCP 8.5” by the IPCC), the annual average temperature of the contiguous United States is projected to rise by as much as 11.9°F by 2100, and in a low emissions scenario (RCP 4.5), by 2.9°F.¹⁴ Globally, 2020 tied with 2016 for the hottest year on record—1.84°F degrees warmer than the baseline mean from 1951 to 1980—and the last seven years have been the seven hottest on record.¹⁵ Summer 2021 was the hottest summer ever recorded in the contiguous United States,¹⁶ and July 2021 was the world’s hottest month ever recorded.¹⁷ This alarming trend is projected to continue over the coming decades.¹⁸

Extreme high temperatures are expected to rise even more than average high temperatures. Climatologists predict that for every 1.8°F (or, 1°C) increase in global temperature, there could be around 21 more extreme heat days in the western U.S. and 26 in the eastern U.S.¹⁹ By 2100, most of Texas, and many parts of Arizona and

¹² Valérie Masson-Delmotte et al., Intergovernmental Panel on Climate Change, AR6 Climate Change 2021: The Physical Science Basis, SPM-10 (2021), https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM_final.pdf.

¹³ *Id.*

¹⁴ Andrew D. King et al., *Reduced Heat Exposure by Limiting Global Warming to 1.5°C*, 8 Nature Climate Change 549, 549–50 (2018).

¹⁵ Nat’l Aeronautics & Space Admin., Press Release, 2020 Tied for Warmest Year on Record, NASA Analysis Shows (Jan. 14, 2021), <https://www.nasa.gov/press-release/2020-tied-for-warmest-year-on-record-nasa-analysis-shows>.

¹⁶ Nat’l Oceanic & Atmospheric Admin., *Summer 2021 Neck and Neck with Dust Bowl Summer for Hottest on Record* (Sept. 9, 2021), <https://www.noaa.gov/news/summer-2021-neck-and-neck-with-dust-bowl-summer-for-hottest-on-record>.

¹⁷ Nat’l Oceanic & Atmospheric Admin., *It’s Official: July Was Earth’s Hottest Month on Record* (Aug. 13, 2021), <https://www.noaa.gov/news/its-official-july-2021-was-earths-hottest-month-on-record>.

¹⁸ See Masson-Delmotte et al., *supra* note 12.

¹⁹ S.E. Perkins-Kirkpatrick & P.B. Gibson, *Changes in Regional Heatwave Characteristics as a Function of Increasing Global Temperature*, 7 Sci. Reports 12256 (2017).

California, may experience more than 100 days over 100°F per year.²⁰ Recent research indicates that heat stress will triple in the Pacific Northwest by 2100 unless aggressive action is taken to reduce greenhouse gas emissions.²¹ Indeed, in the summer of 2021, the Pacific Northwest—a historically temperate region where many residents do not even have home air-conditioning—experienced unprecedented heat waves, with temperatures soaring above 100°F, causing hundreds of excess deaths.²² As Michael E. Mann, a leading climatologist and professor of atmospheric science at Pennsylvania State University explained, this “extreme heat” may soon be called “mid-summer.”²³

Climate change is also spurring increases in humidity, compounding the dangers of extreme heat. To measure the combined effects of heat and humidity, the National Weather Service uses the heat index to approximate what temperature it “feels like” outside.²⁴ For instance, if it is 90°F outside with 60% relative humidity, it actually feels like 100°F to the human body.²⁵ Even more accurate is the wet-bulb globe temperature (WBGT), which estimates the combined effects of temperature, humidity, wind speed, and solar radiation on the body. A WBGT of 35°C (or 95°F) is an upper limit to survivable temperature because at that point, environmental conditions are too hot for bi-directional methods of thermoregulation and too humid for evaporative cooling.²⁶

While there are no observational reports of WBGT values exceeding 35°C in scientific literature to date, a 2020 study found that many locations along the

²⁰ *100° Days, Past and Future*, Nat'l Oceanic & Atmospheric Admin., <https://www.climate.gov/news-features/featured-images/100%C2%B0-days-past-and-future> (last updated July 3, 2021).

²¹ Michael E. Mann & Susan Joy Hassol, *That Heat Dome? Yeah, It's Climate Change*, N.Y. Times (June 29, 2021), <https://www.nytimes.com/2021/06/29/opinion/heat-dome-climate-change.html> (discussing Sourav Mukherjee et al., *Anthropogenic Warming and Population Growth May Double US Heat Stress by the Late 21st Century*, 9 *Earth's Future* (2021)).

²² See Neil Vigdor, *Pacific Northwest Heat Wave Shatters Temperature Records*, N.Y. Times (June 29, 2021), <https://www.nytimes.com/2021/06/27/us/heat-wave-seattle-portland.html>; Nadja Popovich & Winston Choi-Schagrin, *Hidden Toll of the Northwest Heat Wave: Hundreds of Extra Deaths*, N.Y. Times (Aug. 11, 2021), <https://www.nytimes.com/interactive/2021/08/11/climate/deaths-pacific-northwest-heat-wave.html>; Sjoukje Y. Philip et al., *Rapid Attribution Analysis of the Extraordinary Heatwave on the Pacific Coast of the US and Canada June 2021* (2021), <https://www.worldweatherattribution.org/western-north-american-extreme-heat-virtually-impossible-without-human-caused-climate-change/>.

²³ Lydia O'Connor, *Get Used to These Extreme Summer Heat Waves*, HuffPost (July 24, 2016), https://www.huffpost.com/entry/summer-heat-wave-climate-change_n_57951438e4b02d5d5ed1f7eb.

²⁴ See *Heat Forecast Tools*, Nat'l Weather Serv., <https://www.weather.gov/safety/heat-index> (last visited Jan. 23, 2022).

²⁵ See *id.*

²⁶ Steven C. Sherwood & Matthew Huber, *An Adaptability Limit to Climate Change Due to Heat Stress*, 107 *Proc. Nat'l Acads. of Scis.* 9552, 9552 (2010).

southeastern coast of the United States are already experiencing WBGT readings of 31°C to 33°C.²⁷ Indeed, by 2050, the average American could expect to see 17 dangerously hot and humid days in a typical summer, and 35 days by 2090.²⁸ In such a scenario, some summer days would be so unbearably hot and humid that a healthy individual would suffer heat stroke in less than an hour of moderate, shaded outdoor activity.²⁹ Severe illness and death can occur even at WBGT values far below 35°C; in fact, during the Russian heat waves of 2010—the worst heat waves in modern history, which killed approximately 55,000 people—WBGT values never exceeded 28°C.³⁰

Higher average temperatures and extreme heat events are also intensifying the urban heat island effect, a phenomenon in which urbanized areas experience higher surface temperatures than surrounding less congested areas, primarily due to the built environment’s retention of heat.³¹ In particular, cement, pavement, dark rooftops, and other non-vegetated surfaces in cities absorb and store heat, significantly reducing much-needed nighttime cooling.³² Thus, many U.S. cities and suburbs are up to 10°F warmer than surrounding rural areas, and temperatures can even change several degrees within a few blocks depending on whether a neighborhood is primarily paved or if it has trees and other greenery.³³ The urban heat island effect is most pronounced in humid regions (primarily in the eastern United States) and in cities with larger and denser populations.³⁴ The phenomenon is also associated with higher concentrations of air pollutants.³⁵

²⁷ Colin Raymond, Tom Matthews & Radley M. Horton, *The Emergence of Heat and Humidity Too Severe for Human Tolerance*, 6 *Sci. Advances* 1 (2020).

²⁸ Robert Kopp, Jonathan Buzan & Matthew Huber, *The Deadly Combination of Heat and Humidity*, *N.Y. Times* (June 6, 2015), <https://nyti.ms/2k9wG8t>.

²⁹ *Id.*

³⁰ Hannah Hoag, *Russian Summer Tops “Universal” Heatwave Index*, *Nature* (Oct. 29, 2014), <https://www.nature.com/articles/nature.2014.16250>.

³¹ See, e.g., *Heat Island Effect*, U.S. Evtl. Protection Agency, <https://www.epa.gov/heatislands> (last updated Dec. 3, 2021); Sara P. Hoverter, Georgetown Climate Ctr., *Adapting to Urban Heat: A Tool Kit for Local Governments* (2012); City of New York, *Cool Neighborhoods NYC* (2017), https://www1.nyc.gov/assets/orr/pdf/Cool_Neighborhoods_NYC_Report.pdf.

³² N.Y.C. Evtl. Justice All., *NYC Climate Justice Agenda: Midway to 2030* at 11 (2018).

³³ Ellen L. Mccray et al., U.S. Global Change Research Program, *Fourth National Climate Assessment, Northeast* (2018), <https://nca2018.globalchange.gov/chapter/18/>; Joyce Klein Rosenthal et al., *Intra-Urban Vulnerability to Heat-Related Mortality in New York City, 1997-2006*, 30 *Health & Place* 45, 45–47 (2014).

³⁴ Kenneth Hibbard et al., U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment, Changes in Land Cover and Terrestrial Biogeochemistry* (2017), <https://science2017.globalchange.gov/chapter/10/>.

³⁵ *Id.*

Indeed, extreme heat is linked to poor air quality for a variety of reasons. Air often becomes stagnant during heatwaves, trapping pollutants like ground-level ozone and particulate matter—and high temperatures accelerate the formation of these pollutants.³⁶ Ground-level ozone, or smog, forms when heat and sunlight trigger a chemical reaction between nitrogen oxides and volatile organic compounds, two pollutants emitted from sources such as automobiles, industrial facilities, and oil and gas extraction.³⁷ Ground-level ozone can aggravate chronic respiratory conditions, such as asthma, emphysema, and chronic bronchitis, and cause symptoms such as coughing, difficulty breathing, lung inflammation, and increased susceptibility to infection.³⁸ People at the highest risk include children, older adults, people who are active outdoors, especially outdoor workers,³⁹ and low-income individuals.⁴⁰ Numerous studies have linked chronic ozone exposure to premature death from respiratory causes.⁴¹

Extreme heat also creates ideal conditions for wildfires, which worsen air quality by generating particulate matter, or soot.⁴² Fine particulate matter (PM_{2.5}) can penetrate deep into the lungs and enter the bloodstream, predisposing people to infectious diseases and aggravating chronic respiratory conditions.⁴³ A 2021 study found that between March and December 2020, thousands of COVID-19 cases and deaths in California, Oregon, and Washington may have been due to increases in PM_{2.5} from wildfire smoke.⁴⁴ Indeed, PM_{2.5} accounts for a majority of health impacts

³⁶ See Christopher G. Nolte et al., U.S. Global Change Research Program, Fourth National Climate Assessment, Air Quality (2018), <https://nca2018.globalchange.gov/chapter/13/>.

³⁷ See *id.*

³⁸ See *Health Effects of Ozone Pollution*, U.S. Env'tl. Protection Agency, <https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution> (last updated May 5, 2021).

³⁹ *Id.*

⁴⁰ Alejandra Borunda, *In California, Extreme Heat and Ozone Pollution Hit Poor Communities Hardest*, Nat'l Geographic (May 25, 2021), <https://www.nationalgeographic.com/environment/article/-in-california-extreme-heat-and-ozone-pollution-hit-poor-communities-hardest>.

⁴¹ See, e.g., Michael Jerrett et al., *Long-Term Ozone Exposure and Mortality*, 360 New Eng. J. Med. 1085 (2009); Geri Piazza, Nat'l Insts. of Health, *Air Pollution Linked to Risk of Premature Death* (Jan. 9, 2018), <https://www.nih.gov/news-events/nih-research-matters/air-pollution-linked-risk-premature-death>.

⁴² *Wildfires, Extreme Heat Causing Health Harms*, Harv. T.H. Chan Sch. of Pub. Health, <https://www.hsph.harvard.edu/news/hsph-in-the-news/wildfires-extreme-heat-causing-health-harms/> (last visited Jan. 23, 2022).

⁴³ *Health and Environmental Effects of Particulate Matter (PM)*, U.S. Env'tl. Protection Agency, <https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm> (last updated May 26, 2021).

⁴⁴ Xiaodan Zhou et al., *Excess of COVID-19 Cases and Deaths Due to Fine Particulate Matter Exposure During the 2020 Wildfires in the United States*, 13 *Sci. Adv.* 7 (2021).

from air pollution in the United States, and even small changes in concentrations can have significant health effects.⁴⁵

It is evident that extreme heat will only worsen as the climate crisis progresses, resulting in illness and death from both heat exposure and the secondary effects of extreme heat such as air pollution. Accordingly, in developing occupational heat standards, OSHA should consider the rapid progression of climate change, and ensure that preventive measures factor in the likelihood that workers will be exposed to more frequent and intense extreme heat events.

II. Extreme Heat Has Substantial Public Health Impacts.

Exposure to extreme heat can cause a range of heat-related illnesses. The most serious form of heat-related illness is heat stroke, which progresses quickly and is a medical emergency; the internal body temperature can rise to 106°F or higher within 10 to 15 minutes of onset.⁴⁶ Adding to its danger, heat stroke is accompanied by serious, potentially life-threatening symptoms, including confusion, dizziness, hallucinations, coma, and seizures.⁴⁷ Survivors of heat stroke remain at high risk for organ failure or death within a year.⁴⁸

Even comparatively milder heat illnesses can have pernicious short-term and long-term health effects. Heat exhaustion, which often results from a lack of hydration and shade, is characterized by a core temperature of less than 104°F and occurs when the body loses critical amounts of water and salt, particularly through excessive sweating.⁴⁹ Symptoms of heat exhaustion are often nonspecific, such as headache, nausea, dizziness, and weakness, which can make heat exhaustion difficult to identify and diagnose.⁵⁰ Rhabdomyolysis, which is the rapid death of muscle tissue, emerges after prolonged physical labor or exertion in the heat.⁵¹ When muscle tissue breaks down and ruptures, electrolytes and proteins are released into the bloodstream and can cause irregular heart rhythms, seizures, and kidney damage.⁵²

⁴⁵ Nolte et al., *supra* note 36.

⁴⁶ *Heat Stress—Heat Related Illness*, Nat'l Inst. for Occupational Safety & Health, <https://www.cdc.gov/niosh/topics/heatstress/heatrelillness.html> (last updated June 6, 2018); *Climate Change Indicators: Heat-Related Illnesses*, U.S. Env'tl. Protection Agency, <https://www.epa.gov/climate-indicators/heat-related-illnesses> (last updated July 21, 2021).

⁴⁷ *Id.*

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ *Id.*

⁵¹ *Id.*

⁵² Brenda Jacklitsch et al., Nat'l Inst. for Occupational Safety & Health, DHHS Pub. No. 2016-106, *Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot*

Heat syncope, or fainting, is most likely to occur when unacclimatized workers are first exposed to heat stress.⁵³ Heat cramps, which are also common for unacclimatized workers, are painful cramps that primarily occur in individuals performing vigorous physical work or exercise in heat stress conditions.⁵⁴ Both of these illnesses can rapidly progress into more serious conditions and worsen underlying health conditions, but they are readily treatable by removing the individual from heat and providing hydration, ideally with electrolytes.⁵⁵ Sunburn and heat rash, or miliaria, are skin irritations caused by heat exposure, which may also be antecedents to more serious conditions, including skin cancer.⁵⁶

In addition to these acute illnesses, repeated exposure to extreme heat poses significant long-term health risks. For instance, chronic heat stress may be associated with the development of chronic kidney disease of nontraditional origin (CKDnt), which is a kidney disease in patients who do not have the usual risk factors for the disease such as diabetes, hypertension, cardiovascular disease, or old age.⁵⁷ Researchers have linked a CKDnt epidemic among farmworkers in Central America with chronic occupational heat stress.⁵⁸ It is estimated that CKDnt has caused up to 20,000 premature deaths in Central America, affecting primarily young male agricultural workers.⁵⁹ Acute kidney injuries resulting from the combined effects of heat strain and dehydration have also been documented in agricultural workers in the United States, including in California and Florida.⁶⁰

Environments 52 (2016), <https://www.cdc.gov/niosh/docs/2016-106/pdfs/2016-106.pdf> (hereinafter NIOSH Criteria Document).

⁵³ See *Heat Stress—Heat Related Illness*, *supra* note 46; Dep’t of the Navy, NAVMED P-5010-3, Manual of Naval Preventive Medicine: Prevention of Heat and Cold Stress Injuries (Ashore, Afloat, and Ground Forces) at 3–8 (2009), <https://www.med.navy.mil/Portals/62/Documents/BUMED/Directives/All%20Pubs/5010-3.pdf?ver=yohnSL5ixr0E8pzXCJLhCw%3D%3D>.

⁵⁴ *Id.*

⁵⁵ *Id.*

⁵⁶ See *Heat Stress—Heat Related Illness*, *supra* note 46.

⁵⁷ Farmworker Justice & The Migrant Clinicians Network, Heat-Related Illness Clinician’s Guide 2 (2021), https://www.farmworkerjustice.org/wp-content/uploads/2021/06/2021_Heat-Stress_Clinicians-Guide_Aug-2021.pdf.

⁵⁸ Catharine Wesseling et al., *Chronic Kidney Disease of Non-Traditional Origin in Mesoamerica: A Disease Primarily Driven by Occupational Heat Stress*, 44 Rev Panam Salud Publica (2020).

⁵⁹ *Id.*; see also Oriana Ramírez-Rubio et al., *Urine Biomarkers of Kidney Injury Among Adolescents in Nicaragua, a Region Affected by an Epidemic of Chronic Kidney Disease of Unknown Aetiology*, 31 Nephrology Dialysis Transplantation 424 (2016); *CKDnT: A Fatal Epidemic*, La Isla Network, <https://laislanetwork.org/about-ckdu/> (last visited Jan. 23, 2022).

⁶⁰ See Sally Moyce et al., *Heat Strain, Volume Depletion and Kidney Function in California Agricultural Workers*, 74 J. Occupational & Env’tl. Med. 402 (2017); Jacqueline Mix et al., *Hydration Status, Kidney Function, and Kidney Injury in Florida Agricultural Workers*, 60 J. Occupational & Env’tl. Med. 253 (2018).

Researchers in Florida found that, during the summers of 2015 and 2016, 33% of the 192 Florida agricultural workers analyzed in their study had acute kidney injuries on at least one workday.⁶¹ The odds of such injuries increased by 47% for each 5°F increase in the heat index.⁶²

From a public health perspective, the dangers of extreme heat are interwoven with a complex set of variables, including: age; access to healthcare; economic status; geographic location; personal living environment; and occupation.⁶³ Extreme heat aggravates preexisting medical conditions, such as respiratory and cardiovascular diseases, and can even worsen psychiatric conditions.⁶⁴ Numerous studies have indicated that older adults, young children (ages 0 to 4), males, and African Americans are most vulnerable to heat-related mortality and morbidity.⁶⁵ For pregnant individuals, exposure to excess heat at work can increase the chance of giving birth to a baby with a birth defect.⁶⁶

Total deaths and illnesses from heat exposure are likely significantly undercounted.⁶⁷ For instance, between 2010 and 2019, the hottest decade on record, 599 death certificates in California named heat exposure as the cause of death.⁶⁸ Analysis by the Los Angeles Times, however, found that the true death toll is likely six times higher because mortality data show that thousands more people died on extremely hot days than would have been typical during more temperate weather.⁶⁹ Thus, the Times estimates that extreme heat caused about 3,900 deaths, far more than the official tally.⁷⁰ Research suggests that misdiagnosis accounts for much of this disparity. For example, when someone with cardiovascular disease dies from

⁶¹ Mix et al., *supra* note 60.

⁶² *Id.*

⁶³ Vincente R. Barros et al., Intergovernmental Panel on Climate Change, *Climate Change 2014: Impacts, Adaptation, and Vulnerability Part B: Regional Aspects* 1464 (2014); Jeffrey Berko et al., *Deaths Attributed to Heat, Cold, and Other Weather Events in the United States, 2006–2010*, 76 Nat'l Health Stat. Rep. 1, 2 (2014).

⁶⁴ Berko et al., *supra* note 63, at 1.

⁶⁵ *Id.* at 2; Ann E. Carlson, *Heat Waves, Global Warming, and Mitigation*, 26 UCLA J. Envtl. L. & Pol'y 169, 176 (2008).

⁶⁶ *Heat-Reproductive Health*, Nat'l Inst. for Occupational Safety & Health, <https://www.cdc.gov/niosh/topics/repro/heat.html> (last updated Apr. 20, 2017).

⁶⁷ Chloe Jones & Cresencio Rodriguez-Delgado, *We Don't Know Exactly How Many People Are Dying from Heat—Here's Why*, PBS (Aug. 10, 2021), <https://www.pbs.org/newshour/nation/we-dont-know-exactly-how-many-people-are-dying-from-heat-heres-why>.

⁶⁸ Anna M. Phillips, *California's Extreme Heat Deaths Show Climate Change Risks*, L.A. Times (Oct. 7, 2021), <https://www.latimes.com/projects/california-extreme-heat-deaths-show-climate-change-risks/>.

⁶⁹ *Id.*

⁷⁰ *Id.*

heat exposure, the cause of death is often listed as a heart attack even though the causal factor was a heat-related hazard.⁷¹

Extreme heat is already a dire public health threat that will only worsen over the coming decades. Thus, the numerous health risks associated with extreme heat warrant substantial attention from OSHA in its rulemaking process. To minimize these risks, OSHA should require employers to implement ample preventive measures, described in detail below, such as mandatory rest breaks and hydration; training programs and heat alert plans; and the provision of shade and personal protective equipment, as necessary.

III. Low-Income People and People of Color Suffer Disproportionately High Rates of Injury, Illness, and Death from Extreme Heat Exposure, Including in the Workplace.

The health impacts of extreme heat and other climate-related harms are not borne equally.⁷² In the United States, low-income communities and some communities of color suffer elevated rates of mortality and morbidity from extreme heat, with Black individuals being the most vulnerable group.⁷³ This trend may be attributable to the fact that communities of color are more likely to be socio-economically disadvantaged, be excluded from institutional planning processes, lack political capital, live in areas with poor air quality, and work in high-risk occupations.⁷⁴ Low-income individuals, in general, have less access to air-conditioning or temperature-regulated spaces, and often have health conditions, such as diabetes, obesity, or asthma, that predispose them to heat-related illnesses.⁷⁵

In urban areas, low-income neighborhoods with higher percentages of people of color often experience higher temperatures than wealthier, predominantly White neighborhoods, which often have more greenery to reduce the urban heat island

⁷¹ See, e.g., Jian Cui & Lawrence I. Sinoway, *Cardiovascular Responses to Heat Stress in Chronic Heart Failure*, 11 *Curr. Heart Failure Rep.* 139 (2015); see also Memorandum on Inspection Guidance for Heat-Related Hazards from Kimberly Stille, Acting Director, Directorate of Enforcement Programs to Regional Administrators & State Designees (Sept. 1, 2021), <https://www.osha.gov/laws-regs/standardinterpretations/2021-09-01> (recognizing that this misdiagnosis contributes to underreported heat-related deaths).

⁷² See Balbus et al., *supra* note 5.

⁷³ Marie Roth, *A Resilient Community Is One that Includes and Protects Everyone*, 74 *Bulletin of the Atomic Scientists* 91 (2018); Alana Hansen et al., *Vulnerability to Extreme Heat and Climate Change: Is Ethnicity a Factor?*, 6 *Global Health Action* 1, 1–2 (2013).

⁷⁴ *Id.*

⁷⁵ *Id.*

effect.⁷⁶ In a study of inequities associated with extreme heat in Phoenix, Arizona, researchers found that on summer days, average surface temperatures in census tracts decreased by 0.5°F for every \$10,000 increase in median income.⁷⁷ These heat exposure inequities are exacerbated by the fact that low-income individuals often have less access to air-conditioning—and even if they do have air-conditioning, they may not be able to afford the associated electricity costs, which average \$265 annually in the U.S.⁷⁸ Workers without access to air-conditioning or the ability to cool off away from the workplace likely are already at a higher risk of heat stress when they begin their work shifts.⁷⁹

Low-income rural communities are also disproportionately impacted by extreme heat. For instance, a recent study identified higher rates of heat-related illnesses in rural areas of North Carolina compared to urban areas, concluding that the higher incidences were related to the quality of housing stock, non-citizen status, and the labor-intensity of agricultural work.⁸⁰ Climate change is expected to increase harms to rural communities, particularly in the southeastern United States; according to the U.S. Global Change Research Program, by the end of the century, over one-half billion labor hours could be lost from extreme heat-related impacts, negatively affecting the region's labor-intensive agricultural industry and compounding social stresses, such as endemic poverty.⁸¹

Similarly, Tribes, Native groups, and Indigenous communities in the United States experience heightened risks from extreme heat and other climate-related harms, primarily due to pervasive poverty on Indian reservations, which have an overall 28.4% poverty rate.⁸² The Pine Ridge Reservation located in South Dakota has the lowest per capita income in the United States, at \$1,535 per year, and many

⁷⁶ See Ming Wen et al., *Spatial Disparities in the Distribution of Parks and Green Spaces in the USA*, 45 *Annals of Behav. Med.* S18 (2013).

⁷⁷ Sharon L. Harlan et al., *In the Shade of Affluence: The Inequitable Distribution of the Urban Heat Island*, 15 *Res. Soc. Problems & Pub. Pol'y* 173, 185 (2008).

⁷⁸ Rosenthal et al., *supra* note 33, at 56; Danni Mayclin, U.S. Energy Info. Admin., *Air Conditioning Accounts for About 12% of U.S. Energy Expenditures* (July 28, 2018), <https://www.eia.gov/todayinenergy/detail.php?id=36692>.

⁷⁹ Ariel Wittenberg & Zach Colman, *Regulators Refuse to Step in as Workers Languish in Extreme Heat*, *Politico* (Aug. 8, 2021), <https://www.politico.com/news/2021/08/08/osha-climate-change-effects-workforce-heat-impact-501744>.

⁸⁰ Margaret M. Kovach et al., *Area-Level Risk Factors for Heat-Related Illness in Rural and Urban Locations Across North Carolina, USA*, 60 *Applied Geography* 175 (2015).

⁸¹ Adam Terando et al., U.S. Global Change Research Program, *Fourth National Climate Assessment, Southeast* (2018), <https://nca2018.globalchange.gov/chapter/19/>.

⁸² T.M. Bull Bennett et al., U.S. Global Change Research Program, *Third National Climate Assessment, Indigenous Peoples, Land, and Resources* 299 (2014), https://nca2014.globalchange.gov/downloads/low/NCA3_Full_Report_12_Indigenous_Peoples_LowRes.pdf.

reservations have poverty rates above 60%.⁸³ Because of these economic conditions, many Native Americans cannot afford protective measures such as air-conditioning or even internet access that could alert them of impending heat waves or high temperatures.⁸⁴ In addition, compared to the U.S. population at-large, Native Americans suffer from higher rates of heart disease, diabetes, liver disease, and kidney disease,⁸⁵ all of which contribute to a greater risk of heat-related illness and death.

Racial injustice is also inherent in occupational heat exposure because jobs with the highest rates of heat-related illness are disproportionately held by people of color. Recent data show that Hispanic or Latino immigrants in California and the Southwest are overrepresented in the agricultural and construction sectors, and consequently, are disproportionately vulnerable to heat-related fatalities.⁸⁶ According to the U.S. Department of Agriculture, 64% of farm laborers, graders, and sorters identify as Hispanic,⁸⁷ yet Hispanic workers make up just 18% of the entire workforce.⁸⁸ Hispanic workers also make up 48.9% of construction laborers and 63.5% of roofers.⁸⁹ In addition, more than 42% of laborers and freight, stock, and materials movers are Black or Hispanic; and 21.4% of postal service mail carriers and 19.4% of couriers are Black, even though Black Americans make up just 12.3% of the total workforce.⁹⁰ As explained below, all of these occupations are associated with higher rates of heat-related injury, illness, and death.

IV. Millions of Vulnerable Workers in a Range of Industries Face Substantial Health Risks from Outdoor and Indoor Occupational Heat Exposure.

Millions of workers across the country work in industries and occupations that put them at serious risk of injury or death from heat exposure. It is therefore imperative that OSHA promulgate baseline national standards. According to the Bureau of Labor Statistics, there were 56 work-related deaths due to occupational

⁸³ *Id.*

⁸⁴ *Id.*

⁸⁵ *See Disparities*, Indian Health Serv., U.S. Dep't of Health & Human Servs., <https://www.ihs.gov/newsroom/factsheets/disparities/> (last visited Jan. 21, 2022).

⁸⁶ Hansen et al., *supra* 73, at 2–3.

⁸⁷ *Farm Labor*, Econ. Research Serv., U.S. Dep't of Agric., <https://www.ers.usda.gov/topics/farm-economy/farm-labor/#size> (last updated Aug. 18, 2021).

⁸⁸ Kevin Dubina, Dep't of Labor, *Hispanics in the Labor Force: 5 Facts* (Sept. 15, 2021), <https://blog.dol.gov/2021/09/15/hispanics-in-the-labor-force-5-facts>.

⁸⁹ *Labor Force Statistics from the Current Population Survey*, U.S. Bureau of Labor Statistics, <https://www.bls.gov/cps/cpsaat11.htm> (last updated Jan. 20, 2022).

⁹⁰ *Id.*

heat exposure in 2020.⁹¹ The Bureau recorded the highest number of heat-related deaths in 2011 at 61.⁹² From 1992 through 2016, exposure to excessive heat killed 783 U.S. workers and seriously injured 69,374.⁹³ While these numbers are striking, they do not capture the full range of negative impacts to workers, their families, their communities, and the industries in which they work.

Moreover, as OSHA acknowledges, the official number of injuries, illnesses, and deaths from occupational heat exposure is likely significantly understated for a variety of reasons. First, the Bureau of Labor Statistics relies on employer logs submitted pursuant to the Occupational Safety and Health Act, which exempts government agencies, self-employed persons, and household workers.⁹⁴ Second, under OSHA regulations, an employer is not required to report an incident under the current injury reporting requirements if the illness or injury does not require medical treatment beyond first aid, or result in restrictions or days away from work, loss of consciousness, diagnosis by a healthcare professional as a significant injury, or death.⁹⁵ Third, underreporting may stem from self-reporting biases. Employees may be disincentivized to report injuries because of fear of retaliation or lost wages, and employers may seek to avoid increased workers' compensation costs or reputational losses.⁹⁶ These disincentives are heightened for workers in the so-called "gig" economy (e.g., temporary workers) or undocumented, migrant, or low-wage workers, who are often at the greatest risk of heat-related illnesses.⁹⁷

The Bureau of Labor Statistics projects that by 2024, more than 28 million workers in the United States will have jobs that require them to be outdoors at some point during the workday.⁹⁸ This number includes workers in a wide range of industries, including agriculture, forestry, fishing, and hunting; construction; leisure and hospitality; mining, quarrying, and oil and gas extraction; delivery services; transportation and warehousing; and utilities industries. While outdoor workers are exposed to extreme heat more often than indoor workers, workers in factories, warehouses, foundries, and kitchens often work in dangerously hot conditions, even during temperate weather.

⁹¹ *Injuries, Illnesses, and Fatalities*, U.S. Bureau of Labor Statistics, <https://www.bls.gov/iif/oshwc/foi/cftb0343.htm> (last updated Dec. 16, 2021).

⁹² *See 43 Work-Related Deaths Due to Environmental Heat Exposure in 2019*, *supra* note 6.

⁹³ Public Citizen, *Extreme Heat and Unprotected Workers* 4 (2018), https://www.citizen.org/wp-content/uploads/extreme_heat_and_unprotected_workers.pdf.

⁹⁴ *See* 86 Fed. Reg. at 59,311.

⁹⁵ *Id.*

⁹⁶ *Id.*

⁹⁷ *See id.*

⁹⁸ Elka Torpey, *Jobs for People Who Love Being Outdoors*, U.S. Bureau of Labor Statistics: Career Outlook (2017), <https://www.bls.gov/careeroutlook/2017/article/outdoor-careers.htm>.

Nationally, the total number of workers employed in occupations vulnerable to extreme heat in 2021 was approximately 50.3 million.⁹⁹ Of these workers, around 22.6 million, or 45%, were people of color.¹⁰⁰ Some of the most vulnerable industries and occupations are detailed below.

Table 1. Percent of U.S. workers in occupations vulnerable to extreme heat by sex, race, and ethnicity in 2021.¹⁰¹

Occupation	2021					
	Total employed (in thousands)	Percent of total employed ¹⁰²				
		Women	White	Black or African American	Asian	Hispanic or Latino
Total, ages 16 years and over	152,581	46.8%	77.5%	12.3%	6.6%	18.0%
Total, ages 16 years and over in occupations vulnerable to extreme heat ¹⁰³	50,299	25.6%	77.7%	13.9%	4.0%	28.0%

⁹⁹ See *infra* Tbl.1.

¹⁰⁰ *Id.*

¹⁰¹ *Labor Force Statistics from the Current Population Survey*, U.S. Bureau of Labor Statistics, *supra* note 89.

¹⁰² “Estimates for the above race groups (White, Black or African American, and Asian) do not sum to totals because data are not presented for all races. Persons whose ethnicity is identified as Hispanic or Latino may be of any race.” *Id.*

¹⁰³ Based on findings reported in Licker, Dahl, and Abatzoglou (2021) and Park, Pankrantz, and Behrer (2021), the following categories were defined as occupations vulnerable to extreme heat: protective service occupations; food preparation and serving related occupations; building and grounds cleaning and maintenance occupations; couriers and messengers; postal service mail carriers; postal service mail sorters, processors, and processing machine operators; natural resources, construction, and maintenance occupations; and production, transportation, and material moving occupations. See Rachel Licker, Kristina Dahl & John T. Abatzoglou, *Quantifying the Impact of Future Extreme Heat on the Outdoor Work Sector in the United States*, 10 *Elementa: Sci. of the Anthropocene* 48 (2022); R. Jisung Park, Nora Pankratz & A. Patrick Behrer, *Temperature, Workplace Safety, and Labor Market Inequality* (Ctr. for Equitable Growth, Working Paper, July 14, 2021).

A. Agriculture, Forestry, Fishing, and Hunting Workers

According to the U.S. Department of Agriculture's Census of Agriculture report, approximately 2.4 million farmworkers work on our nation's farms and ranches, cultivating and harvesting crops and raising and tending to livestock.¹⁰⁴ Studies have shown that workers in the agricultural sector are at the highest risk of heat-related illness,¹⁰⁵ and crop workers die from heat stress at a rate 20 times greater than the rest of the U.S. workforce.¹⁰⁶ Indeed, multiple reports of heat-related illnesses, injuries, and fatalities among agricultural workers during the summer of 2005 prompted California lawmakers to adopt a regulatory standard for occupational heat illness prevention, the first in nation.¹⁰⁷

Agricultural workers face specific social determinants of health that put them at greater risk of heat-related injury, illness, or death. Data from OSHA and the Bureau of Labor Statistics show that since 2010, Hispanic and Latino workers have accounted for one-third of all heat fatalities, even though they represent only 18% of the national workforce.¹⁰⁸ This disparity is attributable to that fact that Hispanic and Latino workers are overrepresented in the agricultural industry at 64%.¹⁰⁹ These workers are often low-income and/or undocumented and may lack resources such as air-conditioning and clean water to cool off and recover after work.¹¹⁰ Socioeconomic vulnerability and language barriers may also prevent them from demanding safer work conditions from their employer.¹¹¹ Agricultural workers may also be disincentivized from denouncing or reporting unsafe working conditions out

¹⁰⁴ U.S. Dep't of Agric., Nat'l Agric. Stats Serv., 2017 Census of Agriculture tbl. 71 (2019), https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_US/usv1.pdf.

¹⁰⁵ Diane M. Gubernot et al., *The Epidemiology of Occupational Heat Exposure in the United States: A Review of the Literature and Assessment of Research Needs in a Changing Climate*, 58 Int'l J. Biometeorology 1779, 1780 (2014); Diane M. Gubernot et al., *Characterizing Occupational Heat-Related Mortality in the United States, 2000–2010: An Analysis Using the Census of Fatal Occupational Injuries Database*, 58 Am. J. Indus. Med. 203 (2015).

¹⁰⁶ See Letter from July Fulcher & David Arkush, Public Citizen to James Frederick, Acting Assistant Sec'y of Labor for Occupational Safety & Health (May 11, 2021), <https://mkus3lurbh3lbztg254fzode-wpengine.netdna-ssl.com/wp-content/uploads/Heat-Stress-letter-to-James-Frederick-5.11.2021-1.pdf> (citing *Heat-Related Deaths Among Crop Workers—United States, 1992–2006*, Ctrs. for Disease Control & Prevention, <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5724a1.htm> (last updated June 19, 2008)).

¹⁰⁷ See *infra* Factual Background, Part V.A.

¹⁰⁸ Julia Shipley et al., *Heat Is Killing Workers in the U.S.—And There Are No Federal Rules to Protect Them*, NPR (Aug. 17, 2021), <https://www.npr.org/2021/08/17/1026154042/hundreds-of-workers-have-died-from-heat-in-the-last-decade-and-its-getting-worse>.

¹⁰⁹ *Id.*

¹¹⁰ Farmworker Justice & The Migrant Clinicians Network, *supra* note 57, at 4.

¹¹¹ *Id.*

of fear of retaliation.¹¹² Further disincentivizing agricultural workers is the fact that they are often paid at a piece rate rather than by the hour, which may discourage them from taking time to get water or take rest or shade breaks.¹¹³

According to analysis by Public Citizen, on each day in July 2017, an average of 265,000 workers in the agriculture, forestry, fishing and hunting, and mining industries worked in extreme heat.¹¹⁴ Of note, on July 21, 2017, more than 518,000 workers in those industries worked in extreme heat conditions, amounting to 23% of total workers in the industry.¹¹⁵

B. Construction Workers

The construction industry, by its very nature, is a high-hazard industry that experiences high rates of injury, illness, and death, including those caused by extreme heat.¹¹⁶ The industry consists of residential and commercial building construction, along with heavy and civil engineering construction, such as the construction of water and sewer lines, highways, and bridges.¹¹⁷ Specialty trades within the sector include masonry, roofing, plumbing, electrical, drywall, painting, renovation, and demolition of existing structures, among other trades.¹¹⁸

In 2019, the U.S. construction sector employed approximately 11.4 million workers, and those numbers have steadily risen from a decline during the 2007–2008 economic recession.¹¹⁹ Nearly 30% of the workforce is Hispanic.¹²⁰ Over 90% of construction firms in the United States employ 20 or fewer employees.¹²¹ These smaller firms experience a fatality rate from all injuries that is approximately three

¹¹² *Id.*

¹¹³ *Id.*; see also Vicki Hertzberg et al., *Novel Analytic Methods Needed for Real-Time Continuous Core Body Temperature Data*, 39 West J. Nurs. Res. 95 (2017) (The study concluded that four out of five farm workers studied had body temperatures higher than the healthy limit of 100.4°F at least once during a three-day monitoring period. Additionally, about 85% of workers claimed to experience heat-related symptoms, such as dizziness, nausea, headaches, confusion, or fainting, as much of the work occurs in hot enclosed environments and workers are under pressure to meet certain production quotas, requiring rapid work and limited breaks).

¹¹⁴ Public Citizen, *supra* note 93, at 9.

¹¹⁵ *Id.*

¹¹⁶ Scott Earnest et al., *50 Years of NIOSH Construction Safety and Health Research*, NIOSH Sci. Blog (Aug. 16, 2021), <https://blogs.cdc.gov/niosh-science-blog/2021/08/16/construction-50th/>.

¹¹⁷ *Id.*

¹¹⁸ *Id.*

¹¹⁹ *Id.*

¹²⁰ See Ctr. for Construction Research & Training, *The Construction Chart Book* (2018), https://www.cpwr.com/wp-content/uploads/publications/The_6th_Edition_Construction_eChart_Book.pdf; *Labor Force Statistics from the Current Population Survey*, U.S. Bureau of Labor Statistics, *supra* note 89.

¹²¹ Earnest et al., *supra* note 116.

times that of larger contractors, in part, because they generally do not expend resources for health and safety professionals or educational programs.¹²²

Construction workers often work outdoors or in poorly ventilated, closed spaces, making them particularly vulnerable to heat-related illnesses. According to the Bureau of Labor Statistics, in 2020, 21 construction workers died from exposure to extreme heat.¹²³ Indeed, millions of construction workers labor in extreme heat each year. For instance, data analysis by Public Citizen shows that in July 2017, an average of 851,000 workers in the construction industry worked in extreme heat each day.¹²⁴ On July 21, 2017, 2.2 million construction workers across the country went to work in extreme heat, accounting for 30% of workers in the industry.¹²⁵

C. Postal and Delivery Services Workers

Postal and delivery workers are regularly exposed to environmental heat stress—and because of the nature of their time-sensitive work, postal and delivery workers are often unable to adjust their work schedules to avoid extreme temperatures. As the delivery economy grows alongside online shopping and on-demand delivery apps, increasing numbers of workers will face dangerously hot conditions.

From 2012 to 2019, OSHA issued citations to the U.S. Postal Service for exposing about 900 employees across the country to the risks of heat-related injury, illness, and death.¹²⁶ According to OSHA inspection records, the workers experienced extreme muscle cramps, vomiting, loss of consciousness, and heatstroke, among other conditions.¹²⁷ Over the same years, at least five mail carriers died from heatstroke, heat exhaustion, hyperthermia, or heart failure with heat exposure as an underlying factor.¹²⁸

An NBC News analysis of heat-related hospitalizations of UPS workers found that at least 107 workers had been hospitalized from 2015 to 2019, which translates

¹²² *Id.*

¹²³ *Injuries, Illnesses, and Fatalities*, *supra* note 91.

¹²⁴ Public Citizen, *supra* note 93, at 10.

¹²⁵ *Id.*

¹²⁶ Maryam Jameel, *Extreme Heat Doesn't Stop the Mail—Even at the Cost of Postal Workers' Health*, Pub. Integrity (Aug. 6, 2019), <https://publicintegrity.org/inequality-poverty-opportunity/workers-rights/worker-health-and-safety/extreme-heat-post-worker-health/>. As explained below, however, without quantifiable heat standards, OSHA faces substantial legal hurdles in proving the existence of a heat hazard in enforcement cases. *See infra* Factual Background, Part VI.A.1.

¹²⁷ *Id.*

¹²⁸ *Id.*

to one in every 1,000 workers during that four-year period.¹²⁹ Most UPS delivery trucks do not have air-conditioning, and on hot days, the temperature in the cargo area of trucks can reach 140°F or higher.¹³⁰ Warehouse and loading facility workers for delivery companies can also face excessively high temperatures because such facilities are often without air-conditioning.¹³¹ In addition, some delivery workers try to save all of their vacation hours for the hottest days of the year since they fear working in extreme heat without proper protection.¹³²

Couriers, including on-demand delivery workers, also face significant dangers from heat exposure.¹³³ For instance, a 2019 survey of Australian food delivery workers and courier cyclists found that such workers are particularly susceptible to heat stress because they are often unable, among other things, to reschedule or rearrange different work tasks during the workday; take hydration and rest breaks; vary the pace of their work; alter routes; or refuse work, as many fear that they will be deprioritized in the bidding process for future work.¹³⁴

D. Transportation and Material Moving Industry Workers

The transportation and material moving industry—which the Bureau of Labor Statistics broadly defines to include truck drivers, warehousing and storage workers, railyard workers, refuse collectors, air-craft cargo handlers, and gas-station attendants, among many others—has over 12 million outdoor and indoor workers.¹³⁵ According to Bureau of Labor Statistics data, in 2015, transportation and material moving occupations accounted for 720 non-fatal heat-related illnesses with days away from work—one quarter of the total illness cases caused by environmental heat exposure that year.¹³⁶

¹²⁹ Lisa Riordan Seville et al., *In the Hot Seat: UPS Delivery Drivers at Risk of Heat-Related Illnesses*, NBC News (July 18, 2019), <https://www.nbcnews.com/business/economy/hot-seat-ups-delivery-drivers-are-risk-heat-stroke-kidney-n1031321>.

¹³⁰ *Id.*

¹³¹ *Id.*

¹³² See N.Y. SB S1164A, 2021–2022 Leg. Sess., Purpose of Bill and Justification, <https://www.nysenate.gov/legislation/bills/2021/s1164/amendment/a>.

¹³³ See Maria Figueroa et al., *Los Deliveristas Unidos, Essential but Unprotected: App-based Food Couriers in New York City* (2021), <https://img1.wsimg.com/blobby/go/6c0bc951-f473-4720-be3e-797bd8c26b8e/09142021CHARTSLos%20Deliveristas%20Unidos-v02.pdf>.

¹³⁴ See James Goodman et al., *Climate Justice Research Ctr., Uni. of Tech., Sydney, Heat Stress and On-Demand Work: The Experience of Food Delivery and Courier Cyclists* (2019), <https://opus.lib.uts.edu.au/bitstream/10453/134736/1/On%20Demand%20cyclists%20UTS%20final.pdf>.

¹³⁵ *Occupational Employment and Wages—Transportation and Material Moving Occupations*, U.S. Bureau of Labor Statistics, <https://www.bls.gov/oes/current/oes530000.htm> (last updated Mar. 31, 2021).

¹³⁶ *Work Injuries in the Heat in 2015*, TED: The Economics Daily (Aug. 30, 2017), <https://www.bls.gov/opub/ted/2017/work-injuries-in-the-heat-in-2015.htm>.

E. Indoor Workers

Indoor workplaces, including warehouses, factories, kitchens, port terminals, and laundries, can get dangerously hot in temperate weather—and during a heatwave, conditions become even more dangerous. While these workplaces are most vulnerable, heat stress can occur in almost any indoor work setting during the hottest days of the year.

In December 2021, warehouse and storage industry employment reached a record high, with over 1.5 million workers.¹³⁷ This sector has grown dramatically over the past decade due to the rise in e-commerce; indeed, a decade earlier in December 2011, just 668,900 people were employed in the industry.¹³⁸ Often uninsulated and without air-conditioning, warehouses can be particularly dangerous during extreme heat events.¹³⁹ Warehouse workers have reported inhospitably hot work environments along with the lack of air-conditioning and water.¹⁴⁰ Rite Aid warehouse workers interviewed by the Los Angeles Times said there is only one work area in their Southern California warehouse that is air-conditioned—a “chocolate room,” where employees sort bags of chocolate candy before sending them to drugstores for sale.¹⁴¹

But heat-related injuries in warehouses are not limited to heat stress—on hot days, workers are more likely to fall or mishandle dangerous machinery.¹⁴² According to researchers from the University of California, Los Angeles and Stanford University, these injuries may be the result of heat’s ability to impair decision-making and cognitive function.¹⁴³ Their research found that in the manufacturing and distribution industries, on days when the temperature ranged from 95°F to 100°F, injuries increased by about 10% compared to days when the

¹³⁷ *Warehousing and Storage: NAICS 493*, U.S. Bureau of Labor Statistics, <https://www.bls.gov/iag/tgs/iag493.htm> (last updated Jan. 14, 2022).

¹³⁸ See Max Garland, *Warehouse Employment Hits New Record After Monthslong Dip*, Supply Chain Dive (Aug. 17, 2021), <https://www.supplychaindive.com/news/warehouse-employment-robotics-labor-automation-jobs/604920/#:~:text=Warehouse%20employment%20has%20reached%20a,the%20Bureau%20of%20Labor%20Statistics.>

¹³⁹ See Anna M. Phillips, *How Hot Is It Inside Southern California’s Warehouses? Ask the Workers at Rite Aid*, L.A. Times (Oct. 12, 2021), <https://www.latimes.com/environment/story/2021-10-12/heat-risk-rite-aid-workers-southern-california-warehouse.>

¹⁴⁰ *Id.*

¹⁴¹ *Id.*

¹⁴² See Anna M. Phillips, *Study: Hotter Temps Increased Workplace Injuries in California; Incidents Undercounted*, L.A. Times (July 16, 2021), <https://www.latimes.com/environment/story/2021-07-16/study-finds-hotter-temperatures-increased-workplace-injuries-in-california.>

¹⁴³ *Id.*; R. Jisung Park et al., IZA Inst. of Labor Econ., *Temperature, Workplace Safety, and Labor Market Inequality* 19 (2021), <https://ftp.iza.org/dp14560.pdf>.

temperature ranged from 60°F to 65°F.¹⁴⁴ Despite these risks, companies continue to build warehouses, largely without air-conditioning, in hot climates. For instance, since 2010, more than 400 new warehouses have been built in California’s Inland Empire, a region where temperatures regularly soar into the 100s during the summer months, and new warehouses are also springing up in cities along the edge of the Mojave Desert.¹⁴⁵

In addition to warehouse workers, over 10 million workers in the restaurant industry may be exposed to excessive heat both from kitchen equipment and ambient temperature.¹⁴⁶ Elevated temperatures in restaurant kitchens can impair workers’ concentration and cognitive ability, a prospect that is particularly troubling because workers are tasked with maintaining the quality and safety of food served to customers.¹⁴⁷ A 2020 study that examined heat stress and air quality in New York City public school kitchens found that kitchen staff are at a higher risk of injury and illness from heat exposure, which varies based on work rate and degree of heat acclimatization.¹⁴⁸

V. While Some States Have Taken Steps to Protect Their Workers from Occupational Heat, Federal Standards Are Needed to Protect Millions of Vulnerable Workers Across the Nation.

Only a few states have passed legislation to protect workers from outdoor and indoor heat exposure, and to date, no state has implemented a comprehensive program for both outdoor and indoor workers. However, as climate change progresses and heat-related injury, illness, and death become increasingly common in the workplace, a number of states are beginning to take legislative and regulatory action, making this a constructive time for OSHA to establish baseline national standards and requirements for workers across the country. Moreover, in some states, including Massachusetts, OSHA has the exclusive authority to regulate private sector health and safety—meaning that action by OSHA is urgently needed because state and local agencies cannot impose a standard, or investigate or enforce a complaint, violation, or standard.¹⁴⁹

¹⁴⁴ *Id.*

¹⁴⁵ See Anna M. Phillips, *supra* note 139.

¹⁴⁶ *Food Services and Drinking Places: NAICS 722*, U.S. Bureau of Labor Statistics, <https://www.bls.gov/iag/tgs/iag722.htm> (last updated Jan. 4, 2022).

¹⁴⁷ *The Risk of Heat Stress in Restaurant Kitchens*, Province of Ontario Workplace Safety & Prevention Services, <https://www.wsps.ca/resource-hub/articles/the-risk-of-heat-stress-in-restaurant-kitchens> (last visited Jan. 21, 2022).

¹⁴⁸ A. Michael Ierardi & Brian Pavilonis, *Heat Stress Risk Among New York City Public School Kitchen Workers: A Quantitative Exposure Assessment*, 17 *J. Occupational & Env’tl. Hygiene* 353 (2020).

¹⁴⁹ The Massachusetts Department of Labor Standards regulates occupational health and safety matters for state and municipal employees. See Mass. Gen. Laws ch. 149, § 6 ½. The

In addition, the relative scarcity of state standards by no means indicates that occupational heat exposure is unimportant to the states; rather, nearly all states have established some form of recommendations, best practices, guidelines, or other information for employers and workers to learn about and better protect themselves from heat-related hazards in the workplace. As detailed below, many state efforts have proven effective at protecting workers, and OSHA should consider such precedents in establishing national standards.

A. California

During the summer of 2005, when many areas of California experienced extreme high temperatures, five workplace heat-related fatalities were reported to California authorities.¹⁵⁰ In response, California adopted an emergency standard in August 2005, the first of its kind in the nation, to mitigate the risk of occupational heat-related illness and death.

In 2006, California also became the first state to pass a permanent heat illness prevention standard applicable to outdoor workers.¹⁵¹ The Heat Illness Prevention Standard applies to all outdoor places of employment, and it includes provisions on hydration (one quart of potable drinking water per worker per hour); shade (monitoring and providing access, which is required above 80°F, and otherwise, must be timely provided upon request); high-heat procedures for temperatures at or above 95°F;¹⁵² emergency response procedures; acclimatization; training; and heat illness prevention plans.¹⁵³ In addition, all employees must be closely observed by a supervisor or designee during a heat wave, which is defined as “any day in which the predicted high temperature for the day will be at least 80

Department of Labor Standards references OSHA standards as the minimum standards of health and safety for public sector employers. 454 Mass. Code Regs. 25.00.

¹⁵⁰ Cal. Dep’t of Indus. Relations, Congressional Testimony Re: California’s Heat Illness Prevention Standard (July 22, 2019).

¹⁵¹ Cal. Code Regs. tit. 8, § 3395, <https://www.dir.ca.gov/Title8/3395.html>; see also Cal/OSHA, Heat Illness Prevention Regulation Amendments: Guide for Employers and Employees on the New Requirements (2015), <https://www.dir.ca.gov/dosh/documents/Heat-Illness-Prevention-Regulation-Amendments.pdf>.

¹⁵² These procedures are mandatory for five industries (agriculture, construction, landscaping, oil and gas extraction, and transportation/delivery of agricultural products, construction, or other heavy material) and include (a) ensuring effective communication to supervisors, (b) observing/monitoring employees for symptoms of heat related illness, (c) designating a person authorized to call for emergency medical services and allowing others to call when designee is not available, (d) providing reminders to drink water, and (e) conducting meetings pre-shift. For agricultural workers who are required to work outdoors when temperatures reach or exceed 95 degrees Fahrenheit, ten-minute preventive cool-down rest periods must be provided every two hours in addition to all other protective measures. Cal. Code Regs. tit. 8, § 3395.

¹⁵³ *Id.*

degrees Fahrenheit and at least ten degrees Fahrenheit higher than the average high daily temperature in the preceding five days.”¹⁵⁴

In the first five years after implementation of the standard, California’s Division of Occupational Safety and Health, better known as Cal/OSHA, conducted thousands of inspections and assessed millions of dollars in penalties for violations.¹⁵⁵ From 2011 through 2017, California conducted about 4,000 inspections annually to evaluate employers’ compliance with the heat illness standards,¹⁵⁶ and issued more than \$13 million in total penalties.¹⁵⁷ Cal/OSHA saw a significant increase in penalties in the latter years, which it attributes to multiple factors including enhanced training of inspection staff as well as continued non-compliance by certain employers.¹⁵⁸

Cal/OSHA targets its inspections at what have traditionally been the highest-risk industries for outdoor heat-related injuries—the agriculture and construction sectors.¹⁵⁹ Heat-related injuries are a serious health risk for California’s agricultural workers, whose peak work season coincides with elevated summer temperatures and involves prolonged and strenuous outdoor labor.¹⁶⁰ California employers hire the equivalent of over 400,000 full-time workers (which is as many as 829,000 individuals) in the agricultural sector each year. More than 90% of this workforce are Hispanic or Latino immigrants, who speak Spanish or other non-English languages.¹⁶¹ For such workers, language barriers, cultural differences, and unstable immigration statuses can create additional challenges for reporting and investigating incidents of heat illness. Since 2010, California has made efforts to address these challenges by engaging in a comprehensive approach to prevent avoidable heat-related deaths and illnesses, in addition to its enforcement efforts. This approach includes conducting extensive outreach and public education campaigns targeting employers and employees in the agricultural sector.¹⁶²

¹⁵⁴ *Id.*

¹⁵⁵ Public Citizen, *supra* note 93, at 43.

¹⁵⁶ Cal. Dep’t of Indus. Relations, Congressional Testimony Re: California’s Heat Illness Prevention Standard, *supra* note 150, Appendix A.

¹⁵⁷ Public Citizen, *supra* note 93, at 43.

¹⁵⁸ Cal. Dep’t of Indus. Relations, Congressional Testimony Re: California’s Heat Illness Prevention Standard, *supra* note 150.

¹⁵⁹ Public Citizen, *supra* note 93, at 43.

¹⁶⁰ Chelsea Eastman Langer et al., *Are Cal/OSHA Regulations Protecting Farmworkers in California from Heat-Related Illness?*, 63 J. Occupational & Env’tl. Med. 532 (2021), https://journals.lww.com/joem/Fulltext/2021/06000/Are_Cal_OSHA_Regulations_Protecting_Farmworkers_in.13.aspx.

¹⁶¹ *Id.*

¹⁶² Cal. Dep’t of Indus. Relations, 2020 Heat Illness Prevention Campaign Summary, <https://www.dir.ca.gov/dosh/heatillnessinfo.html>.

California’s anti-retaliation laws also protect workers who report violations of the Heat Illness Prevention Standard.¹⁶³

California has also taken steps to address the problem of indoor occupational heat exposure, but those regulations are still under development.¹⁶⁴ Senate Bill 1167, passed in October 2016, directed Cal/OSHA “to propose to the Occupational Safety and Health Standards Board for the board’s review and adoption, a heat illness and injury prevention standard applicable to workers working in indoor places of employment” by January 1, 2019.¹⁶⁵ After extensive research and stakeholder engagement through the rulemaking process, Cal/OSHA released a draft standard.¹⁶⁶

The current draft standard would apply to all indoor work areas where the temperature or heat index equals or exceeds 87°F, or where the temperature exceeds 82°F when workers are wearing personal protective equipment or working in radiant heat.¹⁶⁷ It would also require employers to provide water and cool-down areas, and to develop and facilitate emergency response procedures; worker trainings; acclimatization periods with close observation; and heat-illness prevention plans.¹⁶⁸ In addition, if the temperature or heat index in an indoor work area equals or exceeds 87°F, or under certain other conditions,¹⁶⁹ the draft standard would require an assessment of risks and the implementation of control measures. These measures would include measuring and recording the temperature or heat index; identifying all other environmental risk factors for heat illness; and using control measures (*e.g.*, engineering controls, administrative controls, and personal heat-protective equipment) to minimize the risk of heat-related illness.¹⁷⁰

B. Washington

Enacted in 2008, Washington’s occupational heat stress standard applies only to outdoor workers from May 1st to September 30th annually when employees are exposed to outdoor heat at or above certain applicable ambient temperatures. The applicability of the standard varies based on the clothing worn by the outdoor worker; specifically, the standard applies at 89°F for any clothing; 77°F for double

¹⁶³ Cal. Lab. Code § 6310, <https://www.dir.ca.gov/dlse/howtofilelinkcodesections.htm>.

¹⁶⁴ See Cal/OSHA, Cal/OSHA Research and Standards Health Unit Rulemaking Updates (July 27, 2020), <https://www.dir.ca.gov/dosh/documents/rulemaking-updates.pdf>.

¹⁶⁵ Cal. Legis. Serv. Ch. 839 (S.B. 1167).

¹⁶⁶ Heat Illness Prevention Draft Text, S.B. 1167, <https://www.dir.ca.gov/dosh/doshreg/Heat-Illness-Prevention-Indoors/Draft-revisions-Apr-22-2019.pdf>.

¹⁶⁷ *Id.*

¹⁶⁸ *Id.*

¹⁶⁹ Specifically, if the temperature equals or exceeds 82°F, and employees wear clothing that restricts heat removal or work in a high radiant heat work area. *Id.*

¹⁷⁰ *Id.*

layer clothing, including coveralls; and 52°F for nonbreathing clothing, including vapor barrier clothing or chemical resistant suits.¹⁷¹ In addition, during the heatwaves of summer 2021, Washington issued emergency heat rules for temperatures above 100°F for all outdoor workers.¹⁷² Washington State is also in the process of updating the existing outdoor heat exposure rule through its permanent rulemaking procedures.

Under the Washington standards, employers must provide a variety of protections when the temperature reaches applicable thresholds. For instance, employers must make suitably cool water readily accessible so that all employees can drink at least one quart of drinking water per hour.¹⁷³ While no particular water temperature is required, 50°F to 60°F degrees is recommended.¹⁷⁴

Employers must also provide outdoor workers with shade or sufficient means for cooling down.¹⁷⁵ Acceptable shade blocks direct sunlight to the degree that shadows are not cast under it, and the shaded area must be sufficiently cool for the body to cool off.¹⁷⁶ Employers may provide shade by any natural or artificial means provided that the shade does not expose employees to unsafe or unhealthy conditions and does not deter or discourage access or use.¹⁷⁷ In addition, when the temperature is at or above 89°F, employers must allow and encourage workers to take additional paid preventive cool-down rest periods.¹⁷⁸ Under the emergency standard, when the temperature is at or above 100°F, employers must ensure workers have a paid cool-down rest period of at least 10 minutes every two hours.¹⁷⁹

To facilitate compliance with these requirements, employers are required to provide safety trainings to employees and supervisors in a language they understand.¹⁸⁰

¹⁷¹ Wash. Admin. Code §§ 296-62-095 to 296-62-09560 (2008).

¹⁷² *Id.* § 296-62-09555; *see also* Hal Bernton, *Washington Releases New Heat Rules to Increase Protections for Outdoor Workers*, Seattle Times (July 9, 2021), <https://www.seattletimes.com/seattle-news/washington-releases-new-heat-rules-to-increase-protections-for-outdoor-workers/>.

¹⁷³ Wash. Admin. Code § 296-62-09540 (1).

¹⁷⁴ *See* Wash. State Dep't of Labor & Indus., Questions and Answers: Temporary Emergency Rules for Working in Extreme Heat Conditions (2021), <https://lni.wa.gov/forms-publications/F417-292-000.pdf>.

¹⁷⁵ Wash. Admin. Code § 296-62-09555(3).

¹⁷⁶ *Id.*

¹⁷⁷ *Id.*

¹⁷⁸ *Id.* § 296-62-09530

¹⁷⁹ *Id.* § 296-62-09555(3).

¹⁸⁰ *Id.* § 296-62-09560(1)(a)–(h).

C. Minnesota

Minnesota is the only state that has established standards for indoor workplace heat: the Minnesota Rule on Indoor Ventilation and Temperature in Places of Employment.¹⁸¹ The rule uses the WBGT, as opposed to the ambient air temperature used by California and Washington, but it does not require employers to have a WBGT thermometer. The rule identifies levels of work activity based on caloric needs and provides a table of two-hour time-weighted averages of permissible heat exposure limits for fully-clothed acclimatized workers. For example, “heavy work” such as heavy lifting and shoveling, requires 350 or higher kilocalories spent per hour, and has an associated maximum WBGT exposure level of 77°F.¹⁸² All employees exposed to workplace heat must receive training on Minnesota’s Hazardous Substances and Employee Right-To-Know training provision, which is not specific to heat.¹⁸³

The Minnesota rule also has strict requirements for air flow and circulation in indoor workplaces. Specifically, it requires outdoor air to be provided to all indoor places of employment at a rate of 15 cubic feet per minute per person, and such air must be supplied through air inlets arranged, located, and equipped so that the workers will not be subject to air velocities exceeding 200 feet per minute.¹⁸⁴

In addition to these regulations, Minnesota’s Department of Labor and Industry has issued guidance on the prevention of heat-related illnesses, methods for evaluating heat stress, and methods of controlling heat exposure. The guidance states that for indoor workplaces, when heat exposure limits have been exceeded, employers must implement engineering controls to reduce the temperature. Such controls include improving general ventilation, installing local exhaust ventilation to remove heat produced by machinery, and providing heat shields if radiant heat is at issue.¹⁸⁵ The guidance also cites adequate hydration as the most important measure in reducing heat stress and recommends that cool water be readily available in work areas so that workers do not need to leave the area to get a drink of water.¹⁸⁶ Similarly, the guidance calls upon employers to stress the importance of drinking water frequently and more than thirst indicates.¹⁸⁷

¹⁸¹ Minn. R. 5205.0110.

¹⁸² *Id.* 5205.0110(2)(B).

¹⁸³ *Id.* 5205.0110(2)(C) (referencing *Id.* § 5206.0700).

¹⁸⁴ *Id.* 5205.0110(1).

¹⁸⁵ Minn. Dep’t of Labor & Industry, MNOSHA Heat Stress Guide 7 (2009), https://mn.gov/admin/assets/heat_stress_guide_tcm36-207189.pdf.

¹⁸⁶ *Id.*

¹⁸⁷ *Id.*

D. Oregon

While Oregon does not have occupational heat stress regulations, on July 8, 2021, Oregon OSHA adopted an emergency rule, effective for 180 days, to protect both outdoor and indoor workers from extreme heat after the state experienced temperatures above 100°F for an extended period.¹⁸⁸ The temporary rule used the heat index and required employers to provide access to sufficient shade and drinking water when the heat index was equal to or above 80°F. The rule required more rigorous protective measures above a heat index of 90°F, including a cool-down rest period in the shade of 10 minutes for every two hours of work; the observation of employees for alertness and signs and symptoms of heat illness; and more robust training for employers and employees.¹⁸⁹

E. Other State Efforts

Three other states—Colorado, Maryland, and Nevada—have passed laws requiring state health and safety administrators to promulgate rules related to hazardous heat in the workplace.

Colorado’s proposed regulations would apply to agricultural workers and aim to alleviate heat stress by mandating water, rest breaks, shade, and the reduction of work hours in extreme heat.¹⁹⁰

Maryland’s recent legislation requires the state’s Commissioner of Labor and Industry, in consultation with its Occupational Safety and Health Advisory Board, to develop and adopt regulations that require employers to protect employees from outdoor and indoor heat-related illness caused by heat stress. The proposed standards are due by October 2022.¹⁹¹

Nevada’s proposed regulations would require Nevada employers to mitigate occupational injuries and illnesses resulting from outdoor and indoor heat exposure in the workplace, without specifying any particular industry. The regulations would require all Nevada employers to provide water and training; monitor employees for

¹⁸⁸ Press Release, Oregon OSHA, Oregon OSHA Adopts Emergency Rule Bolstering Protections for Workers Against the Hazards of High and Extreme Heat (July 8, 2021), <https://osha.oregon.gov/news/2021/Pages/nr2021-26.aspx>.

¹⁸⁹ *Id.*

¹⁹⁰ 7 Colo. Code Regs. § 1103-15 (proposed Oct. 29, 2021), <https://cdle.colorado.gov/sites/cdle/files/7%20CCR%201103-15%20%20Agricultural%20Labor%20Conditions%20Rules.pdf>.

¹⁹¹ Md. HB0722, 2020 Reg. Sess., <https://mgaleg.maryland.gov/mgaweb/Legislation/Details/hb0722?ys=2020RS>; Md. SB434, 2020 Reg. Sess., <https://mgaleg.maryland.gov/2020RS/bills/sb/sb0434F.pdf>.

symptoms of heat stress; and remove affected employees from exposure.¹⁹² The regulations would impose additional requirements on Nevada employers whose employees are exposed to temperatures at or above either 80°F or the applicable WBGT determined pursuant to NIOSH and ACGIH standards, which would be adopted by reference into the Nevada regulations.¹⁹³

Other states have proposed legislation on workplace heat. For instance, while New York has not passed any laws requiring the promulgation of outdoor or indoor heat exposure standards, legislators have introduced legislation related to delivery workers. Senate Bill S1164A, proposed for the 2021–2022 legislative session (after an earlier bill was proposed and died in committee in 2019–2020), would amend the New York Labor Law to direct the Department of Labor with the Department of Health, in consultation with the commissioner of health, to establish high heat temperature maximum exposure levels for all delivery companies, including companies like FedEx and UPS.¹⁹⁴ Under the proposed legislation, employers would be required to develop a heat-related illness prevention plan and provide annual training to employees who may be exposed to high heat levels; be required to maintain records related to high heat exposure and prevention plans; and be prohibited from retaliating against employees for reporting heat-related illness concerns.¹⁹⁵ Supervisors would be required to have special training to assist in the prevention of excessive heat exposure.¹⁹⁶

More specifically, workplace heat-related illness prevention plans would be required to include procedures for initial and regular monitoring of employee exposure to heat; the provision of potable water with a temperature of less than 59°F; paid rest breaks and access to shade, cool-down areas, or climate controlled spaces; emergency response procedures for any employee who has suffered injury as a result of excessive heat exposure; acclimatization; time limitations for how long an employee may be exposed to heat during the workday; and a heat alert program to provide notification when a heat wave is likely to occur.¹⁹⁷ The heat alert program would be required to include provisions for postponing tasks that are not urgent; increasing the total number of workers to reduce each worker’s heat exposure; reminding workers to drink liquids in small amounts frequently to prevent

¹⁹² Nev. Dep’t of Bus. & Indus., Notice of Intent to Act on Proposed Regulations, NAC Ch. 618 (Oct. 14, 2021), <https://www.4safenv.state.nv.us/wp-content/uploads/2021/09/OSHA-Heat-Stress-Reg-R053-20-Fourth-Amended-Notice-Intent-Act-090321.pdf>.

¹⁹³ *Id.*

¹⁹⁴ N.Y. SB S1164A, *supra* note 132.

¹⁹⁵ *Id.*

¹⁹⁶ *Id.*

¹⁹⁷ *Id.*

dehydration; and monitoring environmental heat at job sites and resting places.¹⁹⁸ This bill, and its Assembly counterpart (A5361), are currently in committee.¹⁹⁹

Other New York State efforts involve providing information on occupational heat exposure to employers, employees, and the public at-large. For example, in 2006, New York passed the New York State Public Employee Sun Safety Law, amending Section 218-a of the Labor Law, to require New York State public employers to provide sun safety information to state employees who spend more than a total of five hours per week outdoors.²⁰⁰ In addition, the New York State Department of Health offers advice to deal with extreme heat on its webpage, including links to OSHA information and data on heat stress hospitalizations and emergency department visits in the state due to heat.²⁰¹

Nearly all states, through their health, labor, or environmental agencies, have published some guidance or information for employers and employees to minimize the risk of heat-related illnesses. The pervasiveness of such guidance and information shows that states recognize the importance of protecting workers from occupational heat exposure, even if they do not have laws or regulations on the issue.

Pennsylvania, for instance, has not issued any official guidance on protecting workers from harmful heat exposure, but has provided information and training materials for employers and the public. The Pennsylvania Department of Labor and Industry has provided online information, including a Heat Related Injuries and Illnesses Factsheet,²⁰² a Heat Exhaustion and Heat Stroke Factsheet,²⁰³ PowerPoint presentations,²⁰⁴ and a training video.²⁰⁵ The Pennsylvania Office of Rural Health published FAQs related to the EPA's Worker Protection Standard for Pesticide

¹⁹⁸ *Id.*

¹⁹⁹ *Id.*

²⁰⁰ N.Y. Lab. L. § 218-a.

²⁰¹ *Extreme Heat Advice*, N.Y. Dep't of Health, <https://www.health.ny.gov/environmental/emergency/weather/hot/> (last visited Jan. 4, 2022).

²⁰² Pa. Dep't of Labor & Indus., Heat Related Injuries & Illnesses, <https://www.dli.pa.gov/Businesses/Compensation/WC/safety/paths/resources/Documents/Heat%20Related%20Injuries.pdf> (last visited Jan. 20, 2022).

²⁰³ Pa. Dep't of Labor & Indus., Heat Exhaustion and Heat Stroke Factsheet (2012), <https://www.dli.pa.gov/Businesses/Compensation/WC/safety/paths/resources/Documents/Safety%20Talk%20Topics/Heat%20Exhaustion%20Heat%20Stroke.pdf>.

²⁰⁴ See *PATHS Safety Power Points, Heat Related Injuries/Illnesses and Summer Safety*, Pa. Dep't of Labor & Indus., <https://www.dli.pa.gov/Businesses/Compensation/WC/safety/paths/resources/Pages/Safety-PowerPoints.aspx> (last visited Jan. 24, 2022).

²⁰⁵ *Heat Related Injuries*, Pa. Dep't of Labor & Indus., <https://www.dli.pa.gov/Businesses/Compensation/WC/safety/paths/resources/Pages/Safety%20Meetings%20Webinars/Heat-Related-Injuries.aspx> (last visited Jan. 24, 2022).

Handling for farm workers, which clarify that workers should not remove personal protective equipment to avoid heat stress; rather, work should be scheduled at cooler times of day; workers should wear light-colored suits to reflect the heat; and workers should be permitted to stop more frequently for water breaks.²⁰⁶ Pennsylvania’s training materials, especially those tailored to mitigating heat stress when wearing personal protective equipment, are useful guides for developing targeted educational materials.

VI. Existing Standards, Protocols, and Guidance from Government Agencies and Industry Groups Provide a Framework for Federal OSHA Heat Stress Standards.

OSHA’s existing regulations and guidance have not fully protected workers from occupational heat exposure, in part, because without standards directly applicable to heat, it is difficult to enforce workplace hazards. This section provides a detailed overview of applicable OSHA regulations and guidance and evaluates standards, protocols, and guidance developed by NIOSH, the ACGIH, the U.S. Armed Forces, emergency response professionals, and sports medicine physicians that could be adopted by OSHA to better protect workers from outdoor and indoor heat.

A. Existing OSHA Regulations and Guidance

1. The General Duty Clause

Under Section 5(a)(1) of the Occupational Safety and Health Act, commonly known as the General Duty Clause, an employer is legally required to “furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.”²⁰⁷ While OSHA can cite employers for heat stress hazards and workplace safety violations under the General Duty Clause, because OSHA has not established exposure limits, heat hazards are difficult to enforce under the General Duty Clause.²⁰⁸

²⁰⁶ *Farm Worker FAQs: Worker Protection Standard and Agricultural Safety and Health*, Pa. Off. of Rural Health, <https://www.porh.psu.edu/worker-protection-standard-and-agricultural-safety-and-health/farm-worker-faqs/>. The Pennsylvania Office of Rural Health is a partnership between the U.S. Department of Health and Human Service’s Federal Office of Rural Health Policy, the Commonwealth of Pennsylvania, and the Pennsylvania State University.

²⁰⁷ 29 U.S.C. § 654(a)(1).

²⁰⁸ *See, e.g.*, 29 C.F.R. §§ 1910.132, 1915.152, 1917.95 & 1926.28 (requiring personal protective equipment wherever it is necessary, as determined by employers through a hazard assessment); *id.* §§ 1910.141, 1915.88, 1917.127, 1918.95, 1926.51 & 1928.110 (requiring employers to provide employees with potable water); *id.* § 1904.7(b)(5) (requiring employers to report to OSHA work-related injuries and illnesses that resulted in employee medical treatment or loss of

In the advance notice of proposed rulemaking, OSHA acknowledges that enforcement efforts to protect workers from hazardous occupational heat under the General Duty Clause have been met with significant legal challenges, primarily because OSHA cannot require abatement of a workplace hazard unless it can prove in an enforcement proceeding that specific workplace conditions are hazardous.²⁰⁹ OSHA's reliance on third-party documents to identify hazardous heat—such as National Weather Service guidance and NIOSH recommendations, described below—has also been unsuccessful because even though those sources provide detailed scientific data about acceptable exposure levels, they do not have the force of law like an OSHA regulation.²¹⁰ Moreover, in enforcement actions, OSHA is too often unable to demonstrate that specific illnesses are caused by heat stress as opposed to an underlying medical condition or the use of prescribed drugs.²¹¹

Recent court decisions have demonstrated the need for quantifiable occupational heat standards. In *A.H. Sturgill Roofing, Inc.*, a case involving an employee who died from heat stroke, the Occupational Safety and Health Review Commission found that OSHA failed to establish the existence of a hazard under the General Duty Clause, noting “the difficulty in addressing this issue in the absence of an OSHA standard.”²¹² In a concurring opinion, then-Chairperson of the Commission Heather MacDougall added, “[Excessive heat] is not a cognizable hazard under the [General Duty Clause].”²¹³ Thus, without an established heat threshold, it may be difficult for OSHA to meet this burden, even in cases where a fatality has occurred.²¹⁴

Similarly, on July 15, 2020, an Occupational Safety and Health Review Commission administrative judge vacated five OSHA citations in cases where OSHA alleged that the U.S. Postal Service exposed employees to extreme heat when they delivered the mail.²¹⁵ In each of the five cases, the judge found that OSHA had not met its burden of establishing a workplace hazard, even though there was evidence that the heat index was as high as 109°F, and the workers were medically

consciousness); *id.* §§ 1910.151, 1915.87, 1917.26, 1918.97, 1926.50 (requiring employers to ensure the ready availability of persons onsite to render first aid in the absence of medical facilities in near proximity of the workplace).

²⁰⁹ 86 Fed. Reg. at 59,314–15.

²¹⁰ *Id.* at 59,314 (citing *Sec’y of Labor v. Aldridge Elec. Inc.*, No. 13–02119, 2016 WL 8581709 (2016); *Sec’y of Labor v. Industrial Glass*, 1992 WL 88787 (No. 88-348, 1992)).

²¹¹ See Keller & Heckman LLP, *OSHA Turns Up the Heat on Heat Illness*, Nat’l L. Rev. (Oct. 22, 2021), <https://www.natlawreview.com/article/osha-turns-heat-heat-illness>.

²¹² *Sec’y of Labor v. A.H. Sturgill Roofing, Inc.*, No. 13-0224, 2019 WL 1099857 (OSHRC Feb. 28, 2019).

²¹³ *Id.*

²¹⁴ 86 Fed. Reg. at 59,314 (citing *A.H. Sturgill Roofing, Inc.*, 2019 WL 1099857).

²¹⁵ *Sec’y of Labor v. U.S. Postal Serv., Nat’l Ass’n. of Letter Carriers (NALC) & Nat’l Rural Letter Carriers’ Ass’n (NRLCA)*, OSHRC Dkt. Nos. 16-1713; 16-1813; 16-1872; 17-0023 & 17-0279.

diagnosed with heat illnesses.²¹⁶ The judge ruled that without a standard, it is difficult for employers to know what constitutes an excessive heat hazard under the Occupational Safety and Health Act, adding that “OSHA has been urged to promulgate a heat stress standard since shortly after the Act went into effect.”²¹⁷ These cases show that without a heat stress standard, the General Duty Clause alone is an insufficient legal mechanism to enforce workplace heat hazards.

2. Existing OSHA Guidance

OSHA’s Technical Manual outlines four key components of an effective heat-related illness prevention program—an acclimatization program; a medical monitoring program; a training program; and a heat alert program—as well as a four-step process adopted from the ACGIH to assess the presence of a workplace heat hazard.²¹⁸ Specifically, employers should (1) determine the WBGT value; (2) add a clothing adjustment factor; (3) determine the metabolic work rate; and (4) determine the Threshold Limit Value or Action Limit.²¹⁹ The ACGIH’s Threshold Limit Value for heat stress, which applies to acclimatized workers, “refers to heat stress conditions under which it is believed that nearly all workers may be repeatedly exposed without adverse health effects.”²²⁰ The Action Limit is a threshold value for unacclimatized workers. In addition to the recommendations in the Technical Manual, OSHA also directs employers to reference NIOSH’s recommended heat standards, described in detail below.²²¹

While OSHA’s Technical Manual provides detailed and useful guidance, because the recommendations are not legally enforceable, they are largely ineffectual. For instance, one study that examined OSHA’s 84 heat-related enforcement cases in 2012 and 2013 found that just one of the employers had a heat acclimatization program in place, and less than half of the employers had any heat-related illness prevention plan at all.²²² Only 3% of employers adjusted work/rest cycles to adapt to extreme heat conditions, and only 16% used the heat index to evaluate the risk of heat illnesses.²²³ Another study that evaluated 38 heat-related

²¹⁶ *Id.*

²¹⁷ *Id.*

²¹⁸ Occupational Safety & Health Admin., TED 01-00-015, OSHA Technical Manual at Sec. III, Ch.4 (Heat Stress), pt. III, <https://www.osha.gov/otm/section-3-health-hazards/chapter-4> (last updated Sept. 15, 2017).

²¹⁹ *Id.* For an overview of the ACGIH’s Threshold Limit Values and Action Limits, see *infra* Factual Background, Part VI.C.

²²⁰ NIOSH Criteria Document, *supra* note 52, at 100.

²²¹ See *Heat Standards*, Occupational Safety & Health Admin., <https://www.osha.gov/heat-exposure/standards> (last visited Jan. 24, 2022).

²²² Sheila Arbury et al., *A Critical Review of OSHA Heat Enforcement Cases: Lessons Learned*, 58 J. Occupational & Env’tl. Med. 359 (2016).

²²³ *Id.* at 361.

illness enforcement cases between 2011 and 2016 found that, in cases where data were available, none of the employers had heat acclimatization plans or enforced mandatory rest breaks above recommended heat exposure limits, and just 10% of the workplaces even monitored environmental heat.²²⁴

When fully implemented in real-world operations, however, OSHA's guidance has proven successful in preventing serious heat-related illnesses and death. During the 2010 response to the Deepwater Horizon oil spill, OSHA and NIOSH provided guidance and safety expertise to ensure that BP staff were adequately trained, equipped, and protected from intense heat at 17 sites along the Gulf Coast of Louisiana, Mississippi, Alabama, and Florida.²²⁵ OSHA staff made over 4,200 site visits and encouraged BP to keep a comprehensive log of the full spectrum of worker illnesses and injuries, including injuries not required to be reported under OSHA regulations (*i.e.*, injuries that only required first aid).²²⁶ OSHA also advised BP on a robust program to protect workers from heat illnesses, which included work/rest requirements, shaded rest areas, hydration, and onsite heat monitoring.²²⁷

At the height of the response and cleanup, over 42,000 workers were employed by BP and its contractors, including 1,600 National Guard members, and more than 2,400 federal employees.²²⁸ Even though at least 978 heat stress incidents were reported during the clean-up and response, and the Gulf Coast experienced numerous hot and humid days with ambient temperatures at or above 100°F, no workers developed a serious heat illness, and there were no heat-related fatalities.²²⁹ Engagement from OSHA and NIOSH throughout the cleanup process is cited as a primary reason for the relatively small number of heat-related illnesses.²³⁰ Thus, the Deepwater Horizon oil spill response efforts show that rigorous monitoring and enforcement can be an effective means of preventing heat-related illness in the workplace.

Indeed, in 2021, OSHA's Directorate of Enforcement Programs issued Inspection Guidance for Heat-Related Hazards, establishing a new enforcement initiative to prevent heat-related illnesses and deaths for outdoor workers.²³¹ The Inspection Guidance prioritizes heat-related interventions and inspections on days

²²⁴ Aaron W. Tustin et al., *Risk Factors for Heat-Related Illness in U.S. Workers: An OSHA Case Series*, 60 J. Occupational & Env'tl. Med. 383 (2018).

²²⁵ David Michaels & John Howard, *Review of the OSHA-NIOSH Response to the Deepwater Horizon Oil Spill: Protecting the Health and Safety of Cleanup Workers*, PLoS Currents (2012).

²²⁶ *Id.*

²²⁷ *Id.*

²²⁸ *Id.*

²²⁹ *Id.* at 4.

²³⁰ *Id.*

²³¹ See Memorandum on Inspection Guidance for Heat-Related Hazards from Kimberly Stille, *supra* note 71.

when the heat index exceeds 80°F, and instructs OSHA inspectors to identify and assess conditions and activities relevant to heat-related hazards as defined in the OSHA Technical Manual.²³² Due to the increasing frequency of excessively hot and humid days, however, OSHA’s inspection program will need to be supplemented by mandatory and proactive interventions by employers, such as the provision of water, rest, and shade, monitoring, and acclimatization programs.

B. NIOSH Criteria for a Recommended Standard

NIOSH, a subdivision of the CDC established by the Occupational Safety and Health Act of 1970, has recommended occupational heat exposure thresholds that incorporate both environmental and metabolic heat loads. While detailed and protective, these standards may be too complex for workplaces. However, as explained below, OSHA should consider adopting both these standards alongside alternative, less complex heat exposure standards, such as thresholds based on the heat index, a measurement that is readily available through weather reports.

NIOSH is charged with “develop[ing] and establish[ing] recommended occupational safety and health standards.”²³³ In 1972, NIOSH published its first heat-related recommendations (Criteria Document) delineating “heat exposure levels that are safe for various periods of employment, including but not limited to the exposures at which no worker will suffer diminished health, functional capacity, or life expectancy because of his or her work experience.”²³⁴ NIOSH revised the Criteria Document in 1986 and released a second revised version in 2016 to acknowledge the growing risk of heat-related workplace hazards.²³⁵

In the Criteria Document, NIOSH sets out thresholds that indicate a risk of heat stress and recommends methods to prevent employees’ exposure levels from exceeding those thresholds. Specifically, the NIOSH Criteria Document relies on the WBGT as its primary heat measurement, and analyzes the WBGT in conjunction with metabolic rates, acclimatization levels, and work intervals. NIOSH emphasizes the importance of acclimatization in preventing heat-related stress and defines acclimatization as “[t]he physiological changes that occur in response to a succession of days of exposure to environmental heat stress and reduce the strain caused by the heat stress of the environment.”²³⁶ Acclimatization is especially

²³² *See id.*

²³³ Occupational Safety and Health Act of 1970, Pub. L. No. 91-596, § 22, 84 Stat. 1601, 1612.

²³⁴ NIOSH Criteria Document, *supra* note 52, at iii.

²³⁵ *Id.* at v. NIOSH cited the Deepwater Horizon oil disaster response as spurring the 2016 revision of the Criteria Document. *Id.*

²³⁶ NIOSH Criteria Document, *supra* note 52, at xix, 32 (“On repeated exposure to a hot environment, there is a marked adaptation in which the principal physiologic benefit appears to result from an increased sweating efficiency evidenced by earlier onset of sweating, greater sweat

important because, as OSHA recognizes in the advanced notice of proposed rulemaking, approximately 70% of workplace deaths occur within the first few days of work, and nearly 50% occur on the first day of work.²³⁷ Thus, for new workers, NIOSH recommends a gradual phase-in to the workload, with 20% of the usual duration of the work in a hot environment on the first day, and for each subsequent day, an increase of no more than 20%.²³⁸

Using this approach, NIOSH developed Recommended Exposure Limits (RELs), which are heat stress exposure limits for acclimatized workers, and Recommended Alert Limits (RALs), which are heat stress exposure limits for non-acclimatized workers. NIOSH recommends that no worker be exposed to combinations of metabolic and environmental heat greater than applicable RELs or RALs. If relevant RELs or RALs are reached during the workday, employers should initiate various protective measures, including, if necessary, a rest break, which should range in length from 15 to 45 minutes per hour depending on the total heat load.²³⁹ Employees should take these rest breaks in air-conditioning away from the hot environment and, for outdoor environments, in the shade.²⁴⁰ NIOSH also recommends the provision of personal protective equipment, such as cooling vests, when RELs or RALs are reached.²⁴¹ Likewise, employers should provide adequate amounts of cool (less than 59°F) potable water near the work area and “encourage all workers that have been in the heat for up to 2 hours and involved in moderate work activities to drink a cup of water (about 8 oz.) every 15 to 20 minutes.”²⁴²

Calculating an employee’s total heat load—and, in turn, the relevant REL or RAL—is feasible, but potentially complicated for the workplace: Environmental heat loads are measured through a WBGT thermometer, and metabolic heat loads can be approximated according to the ACGIH’s metabolic-work-rate guide, a simple chart that is also recommended in the OSHA Technical Manual.²⁴³ NIOSH recommends monitoring the environmental heat load “at least hourly, during the hottest portion of each work shift, during the hottest months of the year, and when a heat wave occurs or is predicted,” and instituting medical monitoring programs for

production, and lower electrolyte concentration[,] and a concomitant stabilization of the circulation.”).

²³⁷ 86 Fed. Reg. at 59,320.

²³⁸ NIOSH Criteria Document, *supra* note 52, at 34. For workers with previous experience performing the work duties in a hot environment, the corresponding maximum durations of work for days one through four are 50%, 60%, 80%, and 100%. *Id.*

²³⁹ *Id.* at 94–95.

²⁴⁰ *Id.* at viii.

²⁴¹ *Id.* at 7.

²⁴² *Id.* at 9.

²⁴³ Occupational Safety & Health Admin., OSHA Technical Manual, Section III: Ch. 4, Heat Stress, <https://www.osha.gov/otm/section-3-health-hazards/chapter-4> (last updated Sept. 15, 2017).

employees who may be exposed to heat stress at or above a REL or RAL.²⁴⁴ Employers should also conduct health evaluations at the time of hire and at least annually thereafter, and provide that information to a health care provider to provide precautionary guidance for specific workers based on their existing health conditions.²⁴⁵ Employers should establish emergency medical procedures in the event that a worker shows signs or symptoms of heat illness. Those procedures include communication channels and emergency response procedures for supervisors to follow.²⁴⁶

In addition to establishing clear heat exposure thresholds based on RELs and RALs, the NIOSH Criteria Document also provides recommendations for training, education, and emergency response efforts. For instance, NIOSH recommends that employers implement a heat alert program whenever the National Weather Service or other meteorological authority predicts a heat wave, which is defined as a daily maximum ambient temperature exceeding 95°F, or exceeding 90°F and rising 9°F or more above the maximum reached on the preceding days.²⁴⁷ Heat alert program procedures should include heightened medical surveillance, postponing non-urgent work, and increasing rest breaks.²⁴⁸ Similarly, at all times and in all work areas where RELs or RALs may be reached, employers should provide hazard notifications, which include easy-to-understand information about heat stress signs and mitigation techniques in all appropriate languages, and ideally include nonverbal pictures or cartoon drawings.²⁴⁹ In addition, employers should require repeated training and education programs on heat stress hazards, heat alert programs, emergency response procedures, and mitigation.²⁵⁰

Finally, NIOSH recommends heat-related recordkeeping, both for external reporting purposes and for internal evaluation. Through these records, employers should analyze ways to lessen heat exposure risks and modify programs and preventive measures accordingly.²⁵¹ Relatedly, NIOSH states that employers should institute whistleblower protections to encourage workers and supervisors to report heat-related illnesses or heat standard violations without fear of retaliation.²⁵²

In 2018, following an evaluation of outdoor occupational heat-related illnesses, NIOSH published a report recommending that employers comply with its

²⁴⁴ NIOSH Criteria Document, *supra* note 52, at 3.

²⁴⁵ *Id.* at 3–6.

²⁴⁶ *Id.* at 48–51.

²⁴⁷ *Id.* at 10.

²⁴⁸ *Id.* at 10.

²⁴⁹ *Id.* at 6–7.

²⁵⁰ *Id.* at 7–8.

²⁵¹ *Id.* at 6.

²⁵² *Id.* at 6.

unofficial exposure limits that incorporate the WBGT and metabolic heat loads, adding that use of the heat index, which only measures the combined effects of ambient temperature and relative humidity, may not be sufficiently protective.²⁵³ NIOSH, however, also identified weaknesses in its own recommendations. For one, even though NIOSH calls the WBGT the “gold standard,” work sites often do not have specialized WBGT thermometers or equipment and instead rely on the heat index, which is readily available via weather reports.²⁵⁴ NIOSH recommends that if only the heat index is available, heightened preventive measures should be implemented at a heat index of 85°F.²⁵⁵ Thus, in developing heat standards, OSHA should consider promulgating both complex standards—incorporating the WBGT and metabolic heat loads—and, as an alternative, less complex but more readily available heat index standards, along with defined and limited circumstances where employers may opt to use the alternative standards.

NIOSH also recognized in its 2018 report that workers’ acclimatization status, workload, or clothing may be misclassified, resulting in inaccurate metabolic heat loads.²⁵⁶ For instance, during early season heat waves, even long-term workers may be unacclimatized to the sudden onset of extreme heat, thereby warranting acclimatization protocols not just at the beginning of employment, but at the beginning of warmer seasons.²⁵⁷ The report therefore demonstrates that while clearly defined thresholds are essential to preventing heat-related illnesses—and enforcing workplace hazard violations—precautions may be necessary even at lower thresholds.

C. Manufacturing and Industrial Labor Standards

The ACGIH, a non-profit scientific organization that develops proprietary guidelines for occupational and environmental health, publishes Threshold Limit Values and Action Limits to aid industrial hygienists in making decisions on safe levels of exposure to chemical and physical hazards in the workplace. The ACGIH’s Threshold Limit Value and Action Limit for heat stress and strain refer to heat stress conditions under which nearly all acclimatized workers and unacclimatized workers, respectively, can be repeatedly exposed to occupational heat without adverse health effects.²⁵⁸ The Threshold Limit Value therefore assumes that

²⁵³ See Aaron W. Tustin et al., Ctrs. for Disease Control & Prevention, *Evaluation of Occupational Exposure Limits for Heat Stress in Outdoor Workers—United States, 2011–2016*, 67 Weekly 733 (2018).

²⁵⁴ *Id.*

²⁵⁵ *Id.*

²⁵⁶ *Id.*

²⁵⁷ *Id.*

²⁵⁸ See Am. Conf. of Governmental Indus. Hygienists, TLVs® and BEIs® 227–36 (2018) (2017 Edition available at <http://mhssn.igc.org/2017%20ACGIH%20-%20Heat%20Stress%20TLV.pdf>).

workers are acclimatized, adequately hydrated, and unmedicated, and that a healthy worker can be repeatedly exposed to occupational heat without adverse health effects.²⁵⁹ The Threshold Limit Value and Action Limit aim to keep core body temperature within +1°C of normal (37°C) (or, within roughly +1.8°F of 98.6°F) by incorporating environmental factors (expressed as the WBGT adjusted for clothing type) and metabolic heat production (expressed in four work-load categories ranging from light work to very heavy work based on kilocalories spent per hour) into an exposure threshold.²⁶⁰ Once these limits are reached, controls, such as work/rest regimens, shade, and hydration, are necessary to prevent heat-related illness.²⁶¹

The ACGIH limits are consistent with the RELs and RALs recommended by NIOSH, as both specify the maximum combination of environmental heat and metabolic heat to which workers should be exposed. However, like the NIOSH limits, the ACGIH limits may be unduly complicated for certain workplaces, especially for smaller businesses, or for employers and employees who lack technical expertise or do not have access to specialized WBGT thermometers or equipment. Thus, while recommendations from the ACGIH and NIOSH are most protective, OSHA should consider promulgating alternative limits based on the heat index. All standards should be supplemented with robust preventive measures, such as the provision of water, rest, and shade, and acclimatization and training programs.

D. U.S. Armed Forces Guidance

For decades, the U.S. Armed Forces have been at the forefront of developing protective heat standards incorporating metabolic and environmental heat loads. In 1973, the U.S. Navy first developed six Physiological Heat Exposure Limits curves based on the combined effects of metabolic and environmental heat loads for certain activity levels. The Physiological Heat Exposure Limits curves represent the “maximum allowable” exposure times for servicemembers, assuming that they are acclimatized.²⁶² If these endpoints are reached but not exceeded, servicemembers will experience apparent but reversible heat strain.²⁶³ Accordingly, the military stresses the importance of monitoring metabolic and environmental heat loads through dedicated unit supervisors.

In addition, in 2009, the Department of the Navy, Bureau of Medicine and Surgery released a Manual of Naval Preventive Medicine to delineate distinct heat safety standards when ashore, afloat, or participating in ground commands,

²⁵⁹ See NIOSH Criteria Document, *supra* note 52, at 101.

²⁶⁰ See Am. Conf. of Governmental Indus. Hygienists, *supra* note 258.

²⁶¹ See *id.*

²⁶² Dep’t of the Navy, *supra* note 53, at 3-14 to 3-17.

²⁶³ *Id.*

recognizing the unique heat stresses endured in these different situations.²⁶⁴ When ashore, the Navy uses color-coded WBGT categorizations in the form of “flag conditions.” Under this system, color-coded flags are flown in strategic locations at a base or installation to communicate hazardous heat conditions and encourage the adjustment of work/rest cycles.²⁶⁵

Similarly, the U.S. Department of Defense published a Technical Bulletin on Heat Stress Control and Heat Casualty Management (Department of Defense Bulletin), last updated in 2003, in collaboration with the Office of the Surgeon General to develop a preventive program to protect military personnel from increasing risks of heat stress and associated adverse health effects.²⁶⁶ Like the NIOSH Criteria Document and ACGIH standards, the Department of Defense Bulletin uses the WBGT as its temperature index and emphasizes the importance of acclimatization as a heat-illness prevention mechanism, recommending gradually increasing workload and environmental heat exposure over a two-week period.²⁶⁷ More specifically, the Department of Defense Bulletin utilizes a color-coded classification system of environmental heat stress that delineates acceptable levels of physical exertion in four different categories, each of which represents a range of WBGT values: Green (78°F–81.9°F), Yellow (82°F–87.9°F), Red (88°F–89.9°F), and Black (>90°F).²⁶⁸ For each WBGT range, the Department of Defense Bulletin recommends hydration frequencies, measured in quarts per hour, and work/rest cycles for three different work-levels (light, moderate, and hard work) based on metabolic rate, calculated in minutes per hour.²⁶⁹ For instance, when performing “hard work” in the Black WBGT category (>90°F), 10 minutes of work must be alternated with 50 minutes of rest.²⁷⁰ The color-coded classification system also provides adjustment factors for clothing. For example, if a servicemember is wearing body armor, 5°F should be added to the relevant WBGT value.²⁷¹

In addition to specific exposure thresholds, the Department of Defense Bulletin also features more general “Hot Weather Deployment Tips” to prevent heat-related illnesses. This guidance addresses acclimatization and physical fitness; hydration and nutrition; work/rest cycles; first aid; and the “weak link rule,” which calls for an assessment of the heat stress of the entire unit at the first time someone

²⁶⁴ *See id.* at 3–14.

²⁶⁵ *Id.*

²⁶⁶ Dep’t of the Army and Air Force, TB MED 507, Technical Bulletin: Heat Stress Control and Heat Casualty Management at 1 (2003) (hereinafter DOD Bulletin).

²⁶⁷ *Id.*

²⁶⁸ *Id.* at 13 tbl.3-1.

²⁶⁹ *Id.* at 51–53.

²⁷⁰ *Id.*

²⁷¹ *See id.* at 13 tbl. 3-1.

falls ill due to heat.²⁷² The guidance also allocates specific roles for military personnel to aid in administration of and training on heat-related risks.²⁷³

Like other guidance, the military's heat stress prevention standards have strengths and weaknesses. The Department of Defense Bulletin incorporates the WBGT, workload, and clothing type into recommended standards to provide an accurate assessment of tolerable heat levels. Because the military has technical expertise and the resources to procure WBGT thermometers and other specialized equipment, implementation of these standards is decidedly easy, yet it would be potentially complicated for employers. The color-coded flag system could prove beneficial for outdoor workers, especially in the agricultural sector where workers may be stationed far away from a supervisor and, therefore, need to monitor their heat exposure risks themselves. In addition, the military's clearly defined acclimatization protocols, work/rest requirements, and hydration frequencies are effective preventive measures that should inform national standards.

E. Emergency Response Standards

As with the U.S. military, emergency response professional organizations have developed detailed guidance, protocols, and best practices to safeguard workers, specifically fire-fighters and hazardous materials removal workers, from extreme heat. The International Association of Fire Fighters published a Thermal Stress Protocol to provide specific guidance to local union affiliates. The Protocol relies on the WBGT classification system used in the Department of Defense Bulletin, including its corresponding hydration frequencies and work/rest cycles.²⁷⁴ Adding another element of protection, the Thermal Stress Protocol emphasizes the importance of measuring vital signs before and after working at a site and during rest periods.²⁷⁵

For hazardous materials removal, NIOSH, OSHA, the U.S. Environmental Protection Agency, and the U.S. Coast Guard jointly created a manual that recognizes the role of personal protective equipment in significantly increasing a worker's susceptibility to heat stress.²⁷⁶ To that end, the manual calls for regular monitoring of vital signs and work/rest cycles, along with the "adjusted temperature," which factors in the ambient temperature and the estimated percent

²⁷² *Id.* at 55.

²⁷³ *Id.* at 55–57.

²⁷⁴ Int'l Ass'n of Fire Fighters, Thermal Heat Stress Protocol for Fire Fighters and HAZMAT Responders at 1-4 (2018).

²⁷⁵ *Id.*

²⁷⁶ See Nat'l Inst. for Occupational Safety & Health et al., Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985).

sunshine (*i.e.*, the amount of time the sun is covered by clouds).²⁷⁷ For example, if a hazardous materials removal worker is wearing an impermeable ensemble and the adjusted temperature is above 90°F, the worker should undergo physiological monitoring after each 15 minutes of work, regardless of acclimatization level.²⁷⁸

While regular physiological monitoring is essential for firefighters and hazardous materials removal workers—who may be exposed to multiple, often compounding sources of heat, such as body heat, radiant heat, and ambient heat—such persistent monitoring is likely infeasible for the workplace, due to both the technical and time-intensive nature of monitoring vital signs. Nonetheless, regular work/rest cycles, especially if workers are wearing personal protective equipment or their job description requires exposure to excessive radiant heat, are feasible and effective preventive measures.

F. Sports Medicine Guidelines

Because athletes engage in intense physical exertion, often outdoors, athletic associations and sports medicine physicians have developed ample guidance on preventing heat-related illnesses. Guidelines published by the American College of Sports Medicine and the National Athletic Trainers' Association emphasize the importance of hydration supplemented with electrolytes and recommend an acclimatization program of 10 to 14 days for outdoor physical exertion.²⁷⁹ To implement a heat acclimatization program, athletes should progressively increase the intensity and duration of physical activity and gradually phase in any protective equipment.²⁸⁰ Because heat-related illnesses are best treated when recognized immediately, sports medicine guidance advises that any change in performance or personality during periods of exertion, especially in hot and humid weather, should trigger an evaluation of the athlete for heat stress.²⁸¹ Such early intervention is recommended because symptoms of heat stress are often non-specific—such as headaches, dizziness, and irritability—and even more acute symptoms like fainting or vomiting can be easily misdiagnosed as signs of a concussion.²⁸²

This approach, however, may be difficult to adapt to the workplace. In the context of sports, coaches and other staff observe athletes almost constantly,

²⁷⁷ *Id.* at 8-20.

²⁷⁸ *Id.* at 8-22, tbl.8-10.

²⁷⁹ See Lawrence Armstrong et al., American College of Sports Medicine Position Stand: Exertional Heat Illness During Training and Competition, 39 *Med. & Sci. in Sports & Exercise* 556, 558–59 (2007); Brendon P. McDermott et al., *National Athletic Trainers' Association Position Statement: Fluid Replacement for the Physically Active*, 52 *J. Athletic Training Ass'n.* 877 (2017).

²⁸⁰ Douglas J. Casa et al., *National Athletic Trainers' Association Position Statement: Exertional Heat Illnesses*, 50 *J. Athletic Training Ass'n* 986, 987–88 (2015).

²⁸¹ See Armstrong et al., *supra* note 279, at 560.

²⁸² *Id.*

whereas in the workplace, supervisors often cannot be expected to pay such close attention to individual signs of heat stress. That said, requirements for rigorous acclimatization plans that factor in personal protective equipment, and for the provision of water with electrolytes can be easily incorporated into OSHA heat standards.

RECOMMENDATIONS FOR NATIONAL HEAT STANDARDS

Without national heat standards, millions of workers will continue to be exposed to extreme occupational heat that can result in severe illness and even death. These health risks will only worsen as the climate crisis progresses, disproportionately affecting vulnerable communities and workers. Thus, we urge OSHA to begin a rulemaking for national occupational heat standards, and we make the following recommendations for the content of such standards.

First, because it is exceedingly difficult for OSHA to enforce heat hazards in the workplace under the General Duty Clause of the Occupational Safety and Health Act without quantifiable standards, OSHA should promulgate maximum occupational heat exposure thresholds for outdoor and indoor workers that factor in more frequent and intense extreme heat events associated with climate change. Second, OSHA should require employers to implement measures to prevent workers' heat loads from exceeding such thresholds, such as acclimatization plans, mandatory hydration and rest breaks in shaded or cool areas, personal protective equipment, indoor ventilation, heat alert plans, worker training, and monitoring. Third, OSHA should require employers to keep robust records of heat-related illnesses and report incidences of heat illness to OSHA. Fourth, OSHA should supplement recordkeeping and reporting requirements with more regular OSHA workplace inspections. Finally, OSHA should require employers to establish safeguards to protect vulnerable workers from heat-related illnesses and institute whistleblower protection programs for employees, so they are empowered to report violations without fear of retaliation. These recommendations are described in detail below.

I. OSHA Should Set Quantifiable Heat Exposure Thresholds.

In developing occupational heat thresholds, OSHA should consider both environmental and metabolic heat loads. To that end, OSHA should set quantifiable standards based on the WBGT and, as an alternative, standards based on the heat index. OSHA should strongly consider adopting NIOSH's Recommended Exposure Levels (RELs) for acclimatized workers and Recommended Alert Levels (RALs) for unacclimatized workers, which are similar to WBGT-based recommendations from the ACGIH, the U.S. Armed Forces, and emergency response professionals. To determine relevant RELs and RALs, employers or supervisors can measure

environmental heat loads through a WBGT thermometer and approximate metabolic heat loads according to the ACGIH's metabolic-work-rate guide.²⁸³ NIOSH recommends that employers monitor environmental heat “at least hourly, during the hottest portion of each work shift, during the hottest months of the year, and when a heat wave occurs or is predicted,” and institute long-term medical monitoring programs for employees who may be exposed to heat stress at or above relevant RELs or RALs.²⁸⁴

If OSHA determines that RELs and RALs are too complex for the workplace, OSHA should consider adopting the U.S. Armed Forces' classification system for heat stress, which is also recommended by the International Association of Firefighters. As explained above, the Department of Defense Bulletin delineates acceptable levels of physical exertion in four different categories representing a range of WBGT values: Green (78°F–81.9°F), Yellow (82°F–87.9°F), Red (88°F–89.9°F), and Black (>90°F).²⁸⁵ For each range of WBGT values, the DOD Bulletin recommends hydration frequencies and work/rest cycles for different work-levels (*i.e.*, light, moderate, and hard work) based on approximate metabolic rates.²⁸⁶ If OSHA adopts this system, it should also incorporate clothing adjustment factors or specific limits for workers who are required to wear personal protective equipment as part of their job description.

While standards based on the WBGT would be the most protective of workers, because it may not be feasible or reasonable to require workplaces to acquire specialized WBGT thermometers, OSHA should also establish alternative heat standards based on the heat index, a measurement that is readily available through local weather reports. Indeed, Oregon's emergency standards adopted during the summer of 2021 show that heat-index based standards are implementable for both outdoor and indoor workers.²⁸⁷ If OSHA adopts standards based on the heat index as an alternative to WBGT-based standards, OSHA should delineate limited and clearly defined situations where it is appropriate for employers to rely on the heat index-based standards.

NIOSH recommends that if only the heat index is available, employers should implement heat-stress prevention at a heat index of 85°F,²⁸⁸ but recent OSHA enforcement guidance prioritizes heat-related interventions and inspections

²⁸³ See OSHA Technical Manual, *supra* note 218.

²⁸⁴ NIOSH Criteria Document, *supra* note 52, at 3.

²⁸⁵ See DOD Bulletin, *supra* note 266, at 13 tbl.3-1.

²⁸⁶ See *id.* at 51–53.

²⁸⁷ See Press Release, Oregon OSHA, *supra* note 188.

²⁸⁸ NIOSH Criteria Document, *supra* note 52, at 3.

on days when the heat index exceeds 80°F.²⁸⁹ Oregon’s temporary rule required employers to provide access to sufficient shade and drinking water when the heat index was equal to or above 80°F, and provide more rigorous protective measures when the heat index reached 90°F, such as 10-minute rest periods in the shade for every two hours of work.²⁹⁰

Under any standards OSHA adopts, OSHA should require employers to implement robust protective measures once exposure limits are met. Specifically, OSHA should require employers to provide hydration and rest breaks away from the hot environment, either in the shade or in a cool location, and personal protective equipment. Those recommendations, and others, are detailed below.

II. OSHA Should Require Employers to Implement Preventive Measures to Minimize the Risk of Occupational Heat-Related Illness.

To minimize the risk of occupational heat-related illnesses, OSHA should require employers to provide or implement the following preventive measures:

- Acclimatization plans
- Hydration
- Rest breaks in the shade or cool areas
- Personal protective equipment
- Indoor ventilation and air circulation
- Heat alert plans
- Worker training and engagement programs
- Temperature and workload monitoring

In developing the details of these preventive measures, OSHA should take comment on heat-related illnesses by industry and occupation to inform tailored prevention activities. OSHA should also evaluate and solicit comments on how small businesses can reasonably implement appropriate preventive measures.

A. Acclimatization Plans

All heat stress guidance emphasizes the importance of heat acclimatization in reducing the risk of heat-related illnesses. OSHA should therefore require employers to implement heat acclimatization programs for new workers, workers newly exposed to hot environments, workers returning after an absence, and workers who may travel or be transferred to hotter regions for work. NIOSH

²⁸⁹ See Memorandum on Inspection Guidance for Heat-Related Hazards from Kimberly Stille, *supra* note 71.

²⁹⁰ See Oregon OSHA, *supra* note 188.

recommends a gradual phase-in to the workload, with 20% of the usual duration of the work in a hot environment on the first day, and for each subsequent day, an increase of no more than 20%.²⁹¹ The acclimatization period should last 7 to 14 days, and entail close observation of employees for signs and symptoms of heat illness for at least 14 days. In addition, OSHA should require acclimatization programs when workers will be exposed to warmer than usual conditions, such as during heat waves, or at the beginning of warm weather seasons.²⁹²

B. Hydration

OSHA should require employers to provide adequate amounts of cool potable water in or near the work area, at no cost to the workers. As recommended by NIOSH, employers should also encourage all workers who have been in the heat for up to two hours and involved in moderate work activities to drink a cup of water (about 8 oz.) every 15 to 20 minutes. NIOSH also recommends that if workers are sweating for more than two hours, employers should provide hydration supplemented with electrolytes, such as sports drinks, which is also recommended by sports medicine experts. Minnesota's guidance for indoor workers emphasizes that workers should hydrate in small amounts frequently, even if they do not experience strong thirst,²⁹³ as does New York's proposed legislation for delivery workers.²⁹⁴

C. Rest Breaks and Shade

OSHA should require employers to provide and monitor mandatory rest breaks for workers when relevant environmental and metabolic heat loads are met, and to encourage workers to take regular breaks.²⁹⁵ It is essential that rest breaks be both mandatory and paid so that workers do not skip breaks out of fear of lost wages. According to NIOSH, employees should rest for at least 15 minutes per hour when a heat stress hazard is present, and rest breaks must be taken in a cool location, either indoors (ideally in air-conditioning) or outdoors in a shaded area. Under Washington's occupational heat standard, acceptable shade blocks direct sunlight and may be provided by any natural or artificial means so long as it does

²⁹¹ NIOSH Criteria Document, *supra* note 52, at 34. For workers with previous experience performing the work duties in a hot environment, the corresponding maximum durations of work for days 1 through 4 are 50%, 60%, 80%, and 100%. *Id.*

²⁹² *Id.*

²⁹³ Minn. Dep't of Labor & Industry, *supra* note 185, at 7.

²⁹⁴ See N.Y. SB S1164A, *supra* note 194.

²⁹⁵ See Cal. Code Regs. tit. 8, § 3395(d)(3) ("Employees shall be allowed and encouraged to take a preventative cool-down rest in the shade when they feel the need to do so to protect themselves from overheating.")

not expose employees to unsafe or unhealthy conditions and does not deter or discourage access or use.²⁹⁶

Certain industries face unique challenges in providing shade and rest breaks. In the agriculture, forestry, and fishing industries, the provision of shade has been historically important yet difficult to provide, as workers are often working in large, open expanses. Thus, OSHA should specifically consider and solicit comments on how to ensure that such workers have adequate access to shade or other cool areas for rest breaks. OSHA should also consider delivery workers and on-demand delivery couriers, who are often subject to grueling schedules, over which they have little control. To protect those workers, OSHA should consider requiring mandatory shaded breaks when temperatures reach certain thresholds and take comments on how these breaks can be factored into rigorous delivery schedules without undue financial or other repercussions. Similarly, OSHA should consider requiring delivery vehicles to be equipped with air-conditioning.

D. Personal Protective Equipment

OSHA should require employers to provide personal protective equipment, such as cooling vests, when relevant heat thresholds are reached.²⁹⁷ To identify when personal protective equipment is appropriate, OSHA should require employers to conduct hazard assessments tailored to the work likely to be performed in high-heat conditions. For instances where employees provide their own protective equipment, OSHA should consider requiring employers to assure the equipment's adequacy for the workplace, including proper maintenance.

E. Indoor Ventilation and Air Circulation

For indoor workplaces that experience high temperatures, such as foundries, kitchens, and warehouses, OSHA should adopt Minnesota's ventilation and air circulation requirements. Specifically, OSHA should require rates and velocities of air circulation based on the number of people in the workplace. Likewise, OSHA should require employers to implement engineering controls when high temperatures are forecast or heat exposure limits have been exceeded, such as bolstering general ventilation, installing local exhaust ventilation to remove heat produced by machinery, and providing heat shields if radiant heat is at issue.

²⁹⁶ Wash. Admin. Code § 296-62-09555(3).

²⁹⁷ NIOSH Criteria Document, *supra* note 52, at 7.

F. Heat Alert Plans

OSHA already recommends the development of heat alert plans in its Technical Manual to alert workers of hazardous conditions. OSHA should expand on that guidance and require employers to implement heat alert plans whenever the National Weather Service predicts a heat wave, a threshold recommended by NIOSH. Cal/OSHA requires employers to have a written heat illness prevention plan, which must include the employer's procedures for providing water and shade, implementing acclimatization programs, providing emergency medical services, and protecting workers on high-heat days.²⁹⁸

Once heat thresholds are met, heat alert plans should require heightened medical surveillance, the postponement of non-urgent work, and longer rest breaks.²⁹⁹ California's high-heat procedures have additional requirements for days with temperatures above 95°F. Specially, employers must ensure effective communication to supervisors; observe and monitor employees for symptoms of heat-related illness; designate a person authorized to call for emergency medical services and allow others to call when designee is not available; provide regular reminders to drink water; and conduct meetings pre-shift.³⁰⁰

Heat alert plans should also include a notification system for employees, especially when employees are stationed far from a supervisor. One example is the U.S. Navy's use of flag conditions, wherein color-coded flags are flown in strategic locations at a base or installation to communicate hazardous heat conditions.³⁰¹ This type of notification system could prove useful in the agricultural sector, as workers are often dispersed over a large area.

Finally, heat alert plans should include emergency response procedures when an employee becomes ill. For instance, in 2015, Cal/OSHA updated its regulations to require employers to contact EMS when an employee shows signs or symptoms of a serious heat illness.³⁰² Likewise, NIOSH recommends that employers develop communication channels for supervisors to follow in the event of an emergency.³⁰³ Such a requirement would ensure that workers receive timely professional medical attention for serious illnesses.

²⁹⁸ See Cal. Code Regs. tit. 8, § 3395.

²⁹⁹ NIOSH Criteria Document, *supra* note 52, at 10.

³⁰⁰ Cal. Code Regs. tit. 8, § 3395(e).

³⁰¹ Dep't of the Navy, *supra* note 53, at 3–14.

³⁰² Cal. Code Regs. tit. 8, § 3395(f).

³⁰³ NIOSH Criteria Document, *supra* note 52, at 48–51.

G. Worker Training and Engagement

To ensure the efficacy of national heat standards, OSHA should require employers to provide periodic trainings and education programs for workers and supervisors on heat stress hazards, heat alert programs, emergency response procedures, individual vulnerabilities to heat stress, and heat stress mitigation. During these trainings, employees should be allowed to ask questions and request additional instructions or other resources, and the trainings should be appropriate in content and vocabulary to the language, educational level, and literacy of the employees.

Likewise, OSHA should require employers to provide employees with educational materials that include easy-to-understand information about heat stress signs and mitigation techniques in all appropriate languages, and ideally include nonverbal pictures or cartoon drawings.³⁰⁴ These materials should be available at all times and in all work areas where heat exposure thresholds may be reached.

As mentioned above, because small businesses may not have the resources to establish their own training and engagement programs, OSHA should consider developing programs and educational resources that are readily available for employers in a variety of languages. In Massachusetts, the Department of Labor Standards receives federal funding to administer a non-enforcement OSHA On-Site Consultation Program where employers can access confidential, free technical assistance in enhancing their health and safety programs. Such assistance may help smaller firms comply with national standards.

H. Monitoring

OSHA should require employers to develop and implement exposure and health monitoring programs to ensure that workers are not exposed to heat levels above the relevant thresholds. In addition to requiring employers to monitor workplace heat, OSHA should also require the monitoring of environmental heat in shaded areas and resting areas to ensure that workers are afforded adequate protection from the heat.

OSHA should also consider adopting physiological monitoring protocols. For instance, under the Department of the Army's "weak link rule," the heat stress of the entire unit is assessed the first time someone falls ill to heat.³⁰⁵ Similarly, sports medicine guidance recommends that any change in performance or

³⁰⁴ Dep't of the Navy, *supra* note 53, at 6–7.

³⁰⁵ *Id.* at 55.

personality of athletes in hot and humid weather should trigger an evaluation of the athlete for heat stress because non-specific symptoms such as dizziness and irritability are often precursors to heat-related illnesses.³⁰⁶

In addition to daily monitoring, OSHA should also consider requiring employers to either provide or encourage annual medical examinations for workers regularly exposed to heat to determine if they have developed conditions that may make them more vulnerable to excessive heat.

III. OSHA Should Require Employers to Keep Records of All Heat-Related Injuries and Illnesses in the Workplace and to Report Those Records to OSHA.

As OSHA acknowledges, occupational heat-related illnesses are underreported, in part, because employers are not required to report an incident under the current injury reporting requirements if the illness or injury does not require medical treatment beyond first aid, or result in restrictions or days away from work, loss of consciousness, diagnosis by a healthcare professional as a significant injury, or death.³⁰⁷ Thus, OSHA should require employers to keep detailed records of all heat-related injuries, regardless of severity, and provide such records to OSHA. OSHA should also require employers to review the records regularly to identify weaknesses in heat stress protocols, such as heat alert plans, and implement changes to better protect workers.

IV. OSHA Should Enhance Its Workplace Inspection Program.

To supplement recordkeeping and reporting, OSHA should conduct more rigorous workplace inspections.³⁰⁸ In particular, OSHA should enhance inspections based on the parameters described in OSHA's September 2021 Memorandum on Inspection Guidance for Heat-Related Hazards, such as prioritizing inspections on days when the heat index exceeds 80°F.³⁰⁹ As shown by the Deepwater Horizon oil disaster response, regular OSHA inspections, along with detailed recordkeeping, reporting, and monitoring, are essential in preventing serious heat-related illnesses.³¹⁰

³⁰⁶ See Armstrong et al., *supra* note 279.

³⁰⁷ 86 Fed. Reg. at 59,311.

³⁰⁸ While OSHA has not explicitly solicited comments on its enforcement discretion, we believe that more rigorous inspections are "additional efforts or improvements [that] should be undertaken by OSHA to protect workers from hazardous heat." See *id.* at 59,315.

³⁰⁹ See Memorandum on Inspection Guidance for Heat-Related Hazards from Kimberly Stille, *supra* note 71.

³¹⁰ *Id.*

V. OSHA Should Require Employers to Institute Measures to Protect Vulnerable Workers.

Finally, OSHA should require employers to take targeted steps to protect their most vulnerable workers. Specifically, OSHA should develop and require employers to implement a whistleblower protection program, so that workers and supervisors are encouraged to report heat-related illness or heat standard violations without fear of retaliation or lost wages. To that end, OSHA should require employers to adopt a policy prohibiting any person from discriminating or retaliating against an employee for reporting a heat-related concern or seeking assistance with respect to a heat-related hazard.

OSHA should also require employers to provide training on what conditions may make workers particularly vulnerable to heat-related illnesses. In conversation with workers, employers should develop enhanced monitoring and exposure protocols for any workers who may be particularly susceptible. Employers should consider factors such as pre-existing medical conditions, age, and aspects of socio-economic status, such as whether the employee has access to air-conditioning at home.

CONCLUSION

Occupational heat exposure is already a significant threat to the health and safety of workers, and the risks will only increase as the climate crisis progresses. Thus, the undersigned Attorneys General urge OSHA to begin the rulemaking process expeditiously and develop workplace heat standards incorporating the recommendations set forth above.

Respectfully Submitted,

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