VIII. Preliminary Economic Analysis and Initial Regulatory Flexibility Analysis

OSHA has examined the impacts of this rule as required by Executive Order 12866 on Regulatory Planning and Review (September 30, 1993), Executive Order 13563 on Improving Regulation and Regulatory Review (January 18, 2011), Executive Order 14094 entitled "Modernizing Regulatory Review" (April 6, 2023), the Regulatory Flexibility Act (RFA) (September 19, 1980, Pub. L. 96354), section 202 of the Unfunded Mandates Reform Act of 1995 (March 22, 1995; Pub. L. 104-4), and Executive Order 13132 on Federalism (August 4, 1999).

Executive Orders 12866 and 13563 direct agencies to assess all costs and benefits of available regulatory alternatives and, if regulation is necessary, to select regulatory approaches that maximize net benefits (including potential economic, environmental, public health and safety effects, distributive impacts, and equity).[8] The Executive Order 14094 entitled "Modernizing Regulatory Review" (hereinafter, the Modernizing E.O.) amends section 3(f)(1) of Executive Order 12866 (Regulatory Planning and Review). The amended section 3(f) of Executive Order 12866 defines a "significant regulatory action" as an action that is likely to result in a rule: (1) having an annual effect on the economy of $200 million or more in any 1 year (adjusted every 3 years by the Administrator of the Office of Information and Regulatory Affairs (OIRA) for changes in gross domestic product), or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or

[8] While OSHA presents the following analysis under the requirements of Executive Orders 12866 and 13563, the agency ultimately cannot simply maximize net benefits due to the overriding legal requirements in the OSH Act.

State, local, territorial, or tribal governments or communities; (2) creating a serious inconsistency or otherwise interfering with an action taken or planned by another agency; (3) materially altering the budgetary impacts of entitlement grants, user fees, or loan programs or the rights and obligations of recipients thereof; or (4) raise legal or policy issues for which centralized review would meaningfully further the President's priorities or the principles set forth in this Executive Order, as specifically authorized in a timely manner by the Administrator of OIRA in each case.

A regulatory impact analysis (RIA) must be prepared for regulatory actions that are significant per section 3(f)(1) ($200 million or more in any 1 year). OMB's OIRA has determined this rulemaking is significant per section 3(f)(1) as measured by the $200 million or more in any 1 year. Accordingly, OSHA has prepared this Preliminary Economic Analysis (PEA).[9] that to the best of the agency's ability presents the costs and benefits of the rulemaking. OIRA has reviewed this proposed standard, and the agency has provided the following assessment of its impact.

A. Market Failure and Need for Regulation.

I. Introduction.

Executive Order 12866 (58 FR 51735 (September 30, 1993)) and Executive Order 13563 (76 FR 3821 (January 18, 2011)) direct regulatory agencies to assess whether, from a legal or an economic view, a Federal regulation is needed to the extent it is not "required by law." Executive Order 12866 states: "Federal agencies should promulgate

[9] OSHA historically has referred to their regulatory impact analyses (RIAs) as Economic Analyses in part because performing an analysis of economic feasibility is a core legal function of their purpose. But a PEA (or Final Economic Analysis) should be understood as including an RIA.

only such regulations as are required by law, are necessary to interpret the law, or are made necessary by compelling public need, such as material failures of private markets to protect or improve the health and safety of the public, the environment, or the well-being of the American people." This Executive Order further requires that each agency "identify the problem that it intends to address (including, where applicable, the failures of private markets or public institutions that warrant new agency action)" and instructs agencies to "identify and assess available alternatives to direct regulation." (58 FR 51735 (September 30, 1993)). This section addresses those issues of market failure and alternatives to regulation as directed by the Executive Order.

OSHA is proposing a new standard for Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings (29 CFR 1910.148) because the agency has preliminarily determined, based on the evidence in the record, that there is a compelling public need for a comprehensive standard addressing employees' occupational exposure to hazardous heat. OSHA presents the legal requirements governing this standard and its preliminary findings and conclusions supporting the proposed standard in Section II. of the preamble, Pertinent Legal Authority, and throughout other sections of the preamble.

As detailed in Section III.E., OSHA has preliminarily determined that millions of employees are exposed to occupational heat hazards that place them at a significant risk of serious injury, illness, and death. Employees exposed to heat suffer higher rates of non-fatal heat-related injuries and illnesses (HRIs) and heat-related fatalities, including heat stroke, heat exhaustion, heat syncope, rhabdomyolysis, heat cramps, hyponatremia, heat edema, and heat rash; and heat-related injuries, including falls, collisions, and other workplace accidents (see Section IV., Health Effects for additional information). OSHA estimates that the proposed standard would prevent 531 heat-related fatalities (of the estimated 559 annual fatalities) and 16,027 HRIs per year (of the estimated 24,656 annual HRIs).

These estimates have potential limitations. The parameters used to estimate the magnitude of underreporting of HRIs and the effectiveness of the proposed standard have considerable uncertainty. Furthermore, these estimates do not account for other expected benefits from the rule (e.g., reduction in indirect traumatic injuries due to heat and reduction in worker disutility). For additional discussion see Sections VIII.E.IV., Additional Unquantified Potential Benefits and VIII.E.V., Uncertainty in Benefits.

OSHA has also preliminarily determined that the standard is technologically and economically feasible (see Section IX., Technological Feasibility and Section VIII.D., Economic Feasibility). The agency not only finds that this proposed standard is necessary and appropriate to ensure the safety and health of employees exposed to heat, as required by the OSH Act, but also demonstrates, in this section, that this standard corrects a market failure in which labor markets fail to adequately protect employee health and safety.

Even a perfectly functioning market maximizes efficient allocation of goods and services at the expense of other important social values to which the market (as reflected in the collective actions of its participants) is indifferent or undervalues. In such cases, government intervention might be justified to address a compelling public need. The history and enactment of the OSH Act indicate a Congressional view that American markets undervalued occupational safety and health when it set forth the Act's protective purposes and authorized the Secretary of Labor to promulgate occupational safety and health standards.

As discussed in this section, OSHA concludes there is a demonstrable failure of labor markets to protect employees from exposure to significant, unnecessary risks from heat exposure. The agency recognizes that many firms and governments have responded to the risks from heat exposure by implementing control programs for their employees. Information that OSHA has collected suggests that many employees with occupational exposure to hazardous heat currently receive some level of protection against heat hazards and some existing control programs may be as protective as the proposed standard. Nevertheless, the effectiveness of labor markets in providing the level of employee health and safety required by the OSH Act is not universal, as many other employers in the same sectors fail to provide their employees with adequate protection against heat hazards. This is evidenced by the documented injuries, illnesses, and deaths discussed throughout this preamble. Accordingly, the existence of adequate protections in some workplaces speaks to the feasibility of the standard, not necessarily to the lack of need.

In this case, OSHA has preliminarily determined that protections are needed to ensure the safety and health of employees exposed to heat. This section is devoted to showing that markets fail with respect to optimal risk for occupational exposure to heat hazards. Other sections of this preamble address whether, given that markets fail, a new regulation is needed.

The discussion below considers why labor markets, as well as information dissemination programs, workers' compensation systems, and tort liability options, each may fail to protect employees from heat hazards, resulting in the need for a more protective OSHA standard.

II. Labor Market Imperfections.

Under suitable conditions, a market system is economically efficient in the following sense: resources are allocated where they are most highly valued; the appropriate mix of goods and services, embodying the desired bundle of characteristics, is produced; and further improvements in the welfare of any member of society cannot be attained without making at least one other member worse off.

Economic theory, supported by empirical data, posits that, in the labor market, employers and their potential employees bargain over the conditions of employment, including not only salary and other employee benefits, but also occupational risks to employee safety and health. Employers compete among themselves to attract employees. In order to induce potential employees to accept hazardous jobs, employers must offer a higher salary—termed a "wage premium for risk" or "risk premium" for short—to compensate for the additional job risk.[10] Because employers must pay higher wages for more hazardous work, they have an incentive to make the workplace safer by making safety-related investments in equipment and training or by using more costly but safer

[10] The concept of compensating wage differentials for undesirable job characteristics, including occupational hazards, goes back to Adam Smith's *The Wealth of Nations*, which was originally published in 1776. More recent empirical investigation has tended to validate the core theory, with the acknowledgement of labor market imperfections, as otherwise noted in this section (e.g., Lavetti, 2023).

work practices. According to economic theory, the operation of the labor market will provide the optimal level of occupational risk when each employer's additional cost for job safety just equals the avoided payout in risk premiums to employees (Lavetti, 2023). The theory assumes that each employer is indifferent to whether it pays the higher wage or pays for a safer or more healthful workplace but will opt for whichever costs less or improves productivity more.

For the labor market to function in a way that leads to optimal levels of occupational risk, three conditions must be satisfied. First, potential employees and employers must have the same, perfect information—that is, they must be fully informed about their workplace options, including job hazards, or be able to acquire such information. Second, participants in the labor market must directly bear all the costs and obtain all the benefits of their actions. In other words, none of the direct impacts of labor market transactions can be externalized to outside parties. Third, the relevant labor markets must be perfectly competitive, which requires a large number of employers, a large number of employees, and other conditions such that no individual economic agent is able to influence the risk-adjusted wage, and such that the risk-adjusted wage, net of other amenities, is equal to the marginal revenue associated with their output (Card, 2022).

The discussion below examines (1) imperfect information, (2) externalities, and (3) imperfect competition in the labor market in more detail, with particular emphasis on employee exposure to heat hazards, as appropriate.[11]

A. Imperfect Information.

As described below, imperfect information about job hazards is present at several levels that reinforce each other: employers frequently lack knowledge about workplace hazards and how to reduce them; employees are often unaware of the workplace risks to which they are exposed; and employees typically have difficulty in understanding the risk information they are able to obtain. Imperfect information at these various levels has likely impeded the efficient operation of the labor market regarding workplace risk because employees—unaware of job hazards—do not seek, or receive, full compensation for the risks they bear. As a result, even if employers have full knowledge about the risk, their employees do not. If employees do not have full knowledge about the risk, employers have less incentive to invest in safer working conditions than they would in the presence of full information since wages are suppressed below what full knowledge by the employees would yield.

I. Lack of Employer Information.

In the absence of regulation, employers may lack economic incentives to optimally identify the safety and health risks that their employees face.[12] Furthermore,

[11] The section on workers' compensation insurance later in this section identifies and discusses other related market imperfections.

[12] Other private parties may lack sufficient incentives to invest resources to collect and analyze occupational risk data due to the public-good nature of the information. See Ashford and Caldart (1996).

employers have an economic incentive to withhold the information they do possess about job hazards from their employees, whose response would be to demand safe working conditions or higher wages to compensate for the risk. Relatedly, in the absence of regulation, employers, as well as third parties, may have fewer incentives to develop new technological solutions to protect employees on the job.[13]

This suggests that, without regulation, and the incentives that come with it, many employers are unlikely to make themselves aware of the magnitude of heat-related safety and health risks in the workplace or of the availability of effective ways of ameliorating or eliminating these risks. OSHA believes that requiring employers to monitor heat conditions will help to alleviate situations in which employers and/or employees may not realize situations when heat becomes hazardous.

II. Lack of Employee Information about Health Hazards.

Markets cannot adequately address the risks of occupational heat exposure if employees and employers are unaware of the changes in risk brought about by an employer's actions or inaction. Even if employees and employers are aware of a risk, the employer may have limited economic motivation to install controls unless the employees are able to accurately assess the effects of those controls on their occupational risks.

Accordingly, even if employees have a general understanding that they are at increased risk of injury or illness from occupational exposure to heat, it is unrealistic to expect, absent mandatory regulatory requirements, that they know the precise risks

[13] For evidence of regulatory stimuli inducing innovations to improve employee health and safety, see, for example, Ashford et al. (1985), as well as more recent evidence from OSHA's regulatory reviews under section 610 of the RFA (5 U.S.C. 610).

associated with different exposure levels or the exposures they are experiencing, much less that they can use that knowledge to negotiate a significant reduction in exposures and other protections or (if more desirable) trade it for greater hazard pay.

Both experimental studies and observed market behavior suggest that individuals have considerable difficulty rationally processing information about low-probability, high-consequence events such as occupational fatalities and long-term disabilities.[14] For example, many individuals may not be able to comprehend or rationally act on risk information when it is presented, as risk analysis often is, in mathematical terms—a 1/1,000 versus a 1/10,000 versus a 1/100,000 annual risk of death from occupational causes.

Of course, in the abstract, many of the problems that employers and employees face in obtaining and processing occupational risk can lead employees to overestimate as well as underestimate the risk. However, some of the impacts of heat exposure may be sufficiently infrequent, unfamiliar, or unobvious that many employees (and at least some employers) may be completely unaware of the risk, and therefore will underestimate it.

In addition, for markets to optimally address this risk, employees need to be aware of the changes in risk brought about by an employer’s actions. Even if employees are aware of a risk, the employer may have limited economic motivation to install controls or implement protective measures unless the employees are able to accurately

[14] The literature documenting risk perception problems is extensive. See the classic work of Tversky and Kahneman (1974). For a recent summary of risk perception problems and their causes (Thaler and Sunstein, 2009).

assess the effects of those controls or measures on their occupational risks. Furthermore, there is substantial evidence that most individuals are unrealistically optimistic, even in high-stakes, high-risk situations and even if they are aware of the statistical risks (Thaler and Sunstein, 2009). Although the agency lacks specific evidence on the effect of these attitudes on assessing occupational safety and health risks, this suggests that some employees underestimate their own risk of work-related injury or illness and, therefore, even in situations where they have the bargaining power to do so, may not bargain for or receive adequate compensation for bearing those risks. Finally, the difficulty that employees have in distinguishing marginal differences in risk at alternative worksites, both within an industry and across industries, creates a disincentive for employers to incur the costs of reducing workplace risk.

B. Externalities.

Externalities arise when an economic transaction generates direct positive or negative spillover effects on third parties not involved in the transaction. The resulting spillover effect, which leads to a divergence between private and social costs, undermines the efficient allocation of resources in the market because the market is imparting inaccurate cost and price signals to the transacting parties. Applied to the labor market, when costs are externalized, they are not reflected in the decisions that employers and their potential employees make—leading to allocative distortions in that market.

Negative externalities exist in the labor market because many of the costs of occupational injury and illness are borne by parties other than individual employers or employees. The major source of these negative externalities is the occupational injury or illness cost that workers' compensation does not cover.[15] Employees and their employers often bear only a portion of these costs. Outside of workers' compensation, employees incapacitated by an occupational injury or illness and their families often receive health care, rehabilitation, retraining, direct income maintenance, or life insurance benefits, much of which are paid for by society through Social Security and other social insurance and social welfare programs.[16]

Furthermore, substantial portions of the medical care system in the United States are heavily subsidized by the government so that part of the medical cost of treating injured or ill employees is paid for by the rest of society (Nichols and Zeckhauser, 1977). To the extent that employers and employees do not bear the full costs of occupational injury and illness, they will ignore these externalized costs in their labor market negotiations. The result may be an inefficiently high level of occupational risk.

C. Imperfect Competition.

In the idealized labor market, the actions of large numbers of buyers and sellers of labor services establish the market-clearing, risk-compensated wage, so that individual employers and employees effectively take that wage as given. However, the labor market is not one market, but many markets differentiated by location, occupation, and other

[15] Workers' compensation is discussed separately later in this section. As described there, in many cases (particularly for smaller firms), the premiums that an individual employer pays for workers' compensation are only loosely related, or unrelated, to the occupational risks that that employer's employees bear. In addition, workers' compensation does not cover chronic occupational diseases in most instances. For that reason, negative externalities tend to be a more significant issue in the case of occupational exposures that result in diseases.

[16] In addition, many occupational injuries and most occupational illnesses are not processed through the workers' compensation system at all. In these instances, employees receive care from their own private physician rather than from their employer's physician.

factors; entrants in the labor market face search frictions because of limited information on employment options; and, furthermore, in wage negotiations with their own employees, employers are typically in an advantageous position relative to all other potential employers (e.g., Card, 2022). In these situations, discussed below, employers may have sufficient power to influence or to determine the wage their employees receive. This may undermine the conditions necessary for perfect competition and can result in inadequate compensation for employees exposed to workplace hazards. Significant unemployment levels, local or national, may also undermine the conditions necessary for adequate compensation for exposure to workplace hazards (Hirsch et al., 2018).

Beyond the classic—but relatively rare—example of a town dominated by a single company, there is significant evidence that some employers throughout the economy are not wage-takers but, rather, face upward-sloping labor supply curves and enjoy some market power in setting wages and other conditions of employment.[17] An important source of this phenomenon is the cost of a job search and the employer's relative advantage, from size and economies of scale, in acquiring labor market information.[18] Another potentially noteworthy problem in the labor market is that, contrary to the model of perfect competition, employees with jobs cannot without cost quit and obtain a similar job at the same wage with another employer. Employees leaving their current job may be confronted with the expense and time requirements of a job

[17] See Borjas (2000), Ashenfelter et al. (2010), and Boal and Ransom (1997). The term "monopsony" power or "oligopsony" power are sometimes applied to this situation.

[18] See Borjas (2000). As supplemental authorities, Weil (2014) presents theory and evidence both in support of this proposition and to show that, in many situations, larger firms have more market power than smaller firms, while Boal and Ransom (1997) note that the persistent wage dispersion observed in labor markets is a central feature of equilibrium search models.

search, the expense associated with relocating to take advantage of better employment opportunities, the loss of firm-specific human capital (i.e., firm-specific skills and knowledge that the employee possesses[19]), the cost and difficulty of upgrading job skills, and the risk of a prolonged period of unemployment. Finally, employers derive market power from the fact that a portion of the compensation their employees receive is not transferable to other jobs. Examples include job-specific training and associated compensation, seniority rights and associated benefits, and investments in a pension plan.

Under the conditions described above, employers would not have to take the market-clearing wage as given but could offer a lower wage than would be observed in a perfectly competitive market,[20] including less than full compensation for workplace health and safety risks. As a result, relative to the idealized competitive labor market, employers would have less incentive to invest in workplace safety. In any event, for reasons already discussed, an idealized wage premium is not an adequate substitute for a workplace that puts a premium on health and safety.

III. Non-Market and Quasi-Market Alternatives.

The following discussion considers whether non-market and quasi-market alternatives to the proposed standard would be capable of protecting employees from heat hazards. The alternatives under consideration are information dissemination programs, workers' compensation systems, and tort liability options.

[19] MacLeod and Nakavachara (2007) note the correlation between firm-specific skills and relatively high income.
[20] For a graphical demonstration that an employer with monopsony power will pay less than the competitive market wage, see Borjas (2000).

A. Information Dissemination Programs.

One alternative to OSHA's proposed standard could be the dissemination of information, either voluntarily or through compliance with a targeted mandatory information rule, akin to OSHA's Hazard Communication standard (29 CFR 1910.1200), which would provide more information about the safety and health risks associated with exposure to environmental heat. Better informed potential employees could more accurately assess the occupational risks associated with different jobs, thereby facilitating, through labor market transactions, higher risk premiums for more hazardous work and inducing employers to make the workplace less hazardous. The proposed standard recognizes the link between the dissemination of information and workplace risks by requiring that employees exposed to heat be provided with information and training about the risks they encounter and ways to mitigate those risks. There are several reasons, however, why reliance on information dissemination programs alone would not yield the level of employee protection achievable through the proposed standard, which incorporates hazard communication as part of a comprehensive approach designed to control the hazard in addition to providing for the disclosure of information about it.

First, in the case of voluntary information dissemination programs, absent a regulation, there may be significant economic incentives, for all the reasons discussed in Section VIII.A.II. above, for the employer *not* to gather relevant exposure data or distribute occupational risk information so that the employees would not change jobs or demand higher wages to compensate for their newly identified occupational risks.

Second, even if employees were better informed about workplace risks and hazards, all of the defects in the functioning of the private labor market previously discussed—the limited ability of employees to evaluate risk information, externalities, and imperfect competition—would still apply. Because of the existence of these defects, better information alone would not lead to wage premiums for risk that would incentivize employers to make workplaces safer, in accordance with compensating differentials theory (Lavetti, 2023). Regardless, as mentioned above in Section VIII.A.I., even the level of employee safety and health attained by the wage premium under efficient markets may be lower than the level justified by other important social values that efficient markets may undervalue. Finally, as discussed in Section VIII.E., Benefits, a number of additional safety provisions under the proposed standard would complement information and training provided by other regulatory vehicles.

Thus, while improved access to information about heat-related hazards can provide for more rational decision-making in the private labor market, OSHA concludes that information dissemination programs would not, by themselves, produce an adequate level of employee protection.

B. Workers' Compensation Systems.

Another theoretical alternative to OSHA regulation could be to determine that no standard is needed because State workers' compensation programs augment the workings of the labor market to limit occupational risks to employee safety and health. After all, one of the objectives of the workers' compensation system is to shift the costs of occupational injury and illness from employees to employers in order to induce employers to improve working conditions. Two other objectives relevant to this discussion are to provide fair and prompt compensation to employees for medical costs and lost wages resulting from workplace injury and illness and, through the risk-spreading features of the workers' compensation insurance pool, to prevent individual employers from suffering a catastrophic financial loss (Ashford, 2007).

OSHA identifies two primary reasons, discussed below, why the workers' compensation system has fallen short of the goal of shifting to employers the costs of workplace injury and illness—including, in particular, the costs of employee exposure to heat-related hazards. As a result, OSHA concludes that workers' compensation programs alone do not adequately protect employees.

I. Limitations on Payouts.

The first reason that employers do not fully pay the costs of work-related injuries and illnesses under the workers' compensation system is that, even for those claims that are accepted into the system, states have imposed significant limitations on payouts. Depending on the state, these limitations and restrictions include:

- Caps on wage replacement based on the average wage in the state rather than the injured employee's actual wage;
- Restrictions on which medical care services are compensated and the amount of that compensation;
- No compensation for non-pecuniary losses, such as pain and suffering or impairment not directly related to earning power;
- Either no, or limited, cost-of-living increases;

- Restrictions on permanent, partial, and total disability benefits, either by specifying a maximum number of weeks for which benefits can be paid or by imposing an absolute ceiling on dollar payouts; and
- A low absolute ceiling on death benefits.

II. A Divergence between Workers' Compensation Premiums and Workplace Risk.

The second reason workers' compensation does not adequately shift the costs of work-related injuries and illnesses to employers is that the risk-spreading objective of workers' compensation conflicts with, and ultimately helps to undermine, the cost-internalization objective.[21] For the 99 percent of employers who rely on workers' compensation insurance,[22] the payment of premiums represents their primary cost for occupational injuries and illnesses, such as heat-related injuries and illnesses. However, the mechanism for determining an employer's workers' compensation insurance premium typically fails to reflect the actual occupational risk present in that employer's workplace.

Approximately 85 percent of employers have their premiums set based on a "class rating," which is based on *industry* illness and injury history. Employers in this class are typically the smallest firms and represent only about 15 percent of employees (Ashford, 2007). Small firms are often ineligible for experience rating because of insufficient

[21] Recall from the earlier discussion of externalities that the failure to internalize costs leads to allocative distortions and inefficiencies in the market.
[22] Only the largest firms, constituting approximately 1 percent of employers and representing approximately 15 percent of employees, are self-insured. These individual firms accomplish risk-spreading as a result of the large number of employees they cover (Ashford, 2007). From 2000 to 2020, the share of Workers' Compensation Benefits paid by self-insured employers rose from 22.0 percent to 24.7 percent (Murphy and Wolf, 2022).

claims history or because of a high year-to-year variance in their claim rates. These firms are granted rate reductions only if the experience of the entire class improves. The remaining 14 percent of employers, larger firms representing approximately 70 percent of employees, have their premiums set based on a combination of "class rating" and "experience rating," which adjusts the class rating to reflect a firm's individual claims experience. A firm's experience rating is generally based on the history of workers' compensation payments to employees injured at that firm's workplace, not on the quality of the firm's overall employee protection program or safety and health record. Thus, for example, the existence of circumstances that may lead to catastrophic future losses are not included in an experience rating—only actual past losses are included.[23] Insurance companies do have the right to refuse to provide workers' compensation insurance to an employer—and frequently exercise that right based on their inspections and evaluations of a firm's health and safety practices. However, almost all states have assigned risk pools that insist that any firm that cannot obtain workers' compensation policies from any insurer must be provided workers' compensation insurance at a state-mandated rate that reflects a combination of class and experience rating. Workers' compensation insurance does protect individual employers against a catastrophic financial loss due to work-related injury or illness claims. As a result of risk spreading, however, employers' efforts to reduce the incidence of occupational injuries and illnesses are not fully reflected in

[23] In order to spread risks in an efficient manner, it is critical that insurers have adequate information to set individual premiums that reflect each individual employer's risks. As the preceding discussion has made clear, by and large, they do not. In that sense, insurers can be added to employers and employees as possessing imperfect information about job hazards.

reduced workers' compensation premiums. Conversely, employers who devote fewer resources to promoting employee safety and health may not incur commensurately higher workers' compensation costs. This creates a type of moral hazard, in that the presence of risk spreading in workers' compensation insurance may induce employers to make fewer investments in equipment and training to reduce the risk of workplace injuries and illnesses.

In short, the premiums most individual employers pay for workers' compensation insurance coverage do not reflect the actual cost burden those employers impose on the worker's compensation system. Consequently, employers considering measures to lower the incidence of workplace injuries and illnesses can expect to receive a less-than-commensurate reduction in workers' compensation premiums. Thus, for all the reasons discussed above, the workers' compensation system does not provide adequate incentives to employers to control occupational risks to worker safety and health.

C. Tort Liability Options.

Another alternative to OSHA regulation could be for employees to use the tort system to seek redress for work-related injuries and illnesses, including heat-related ones.[24] A tort is a civil wrong (other than breach of contract) for which the courts can provide a remedy by awarding damages. The application of the tort system to occupational injury and illness would allow employees to sue their employer, or other

[24] The OSH Act does not provide a private right of action that would allow affected workers to sue their employers for safety hazards subject to the Act (see *Am. Fed. of Gov. Employees, AFL-CIO v. Rumsfeld*, 321 F.3d 139, 143-44 (D.C. Cir. 2003)).

responsible parties where applicable (e.g., "third parties" such as suppliers of hazardous material or equipment used in the workplace) to recover damages. In theory, the tort system could shift the liability for the direct costs of occupational injury and illness from the employee to the employer or to other responsible parties. In turn, the employer or third parties would be induced to improve employee safety and health.

With limited exceptions, the tort system has not been a viable alternative to occupational safety and health regulation. In addition, state statutes make workers' compensation the "exclusive remedy" for work-related injuries and illnesses. Workers' compensation is essentially a type of no-fault insurance. In return for employers' willingness to provide, through workers' compensation, timely wage-loss and medical coverage for workers' job-related injuries and illnesses, regardless of fault, employees are barred from suing their employers for damages, except in cases of intentional harm or, in some states, gross negligence (Ashford and Caldart, 1996). Even in cases of gross negligence where it is possible for employees to sue, establishing gross negligence in these incidences is complicated by heat conditions as these conditions may be temporary and localized, and not necessarily measured at the time of incident. Practically speaking, in most cases, workers' compensation is the exclusive legal remedy available to employees for workplace injuries and illnesses.

Employees are thus generally barred from suing their own employers in tort for occupational injuries or illnesses but may attempt to recover damages for work-related injuries and illnesses, where applicable, from third parties through the tort system. However, it is unlikely that a third party could be successfully sued for workplace exposure to hazardous heat since there is no third party responsible for exposing employees to dangerous conditions in these circumstances. This means that even this inadequate remedy would be unavailable to employees injured from heat exposure.

In sum, the use of the tort system as an alternative to regulation is severely limited because of the "exclusive remedy" provisions in workers' compensation statutes; because of the various legal and practical difficulties in seeking recovery from responsible third parties or the lack of a responsible third party altogether; and because of the substantial costs associated with a tort action. The tort system, therefore, does not adequately protect employees from exposure to hazards in the workplace.

IV. Summary.

OSHA's primary reasons for proposing this standard are based on the requirements of the OSH Act, which are discussed in Section II. of the preamble, Pertinent Legal Authority. As shown in the preamble to the proposed standard and this PEA, OSHA has determined that employees in many industries are exposed to safety and health hazards from exposure to environmental and process heat in the workplace. This section has shown that labor markets—even when augmented by information dissemination programs, workers' compensation systems, and tort liability options—still operate at a level of risk for these employees that is higher than socially optimal due to a lack of information about safety and health risks, the presence of externalities or imperfect competition, and other factors discussed above.

B. Profile of Affected Industries.

I. Introduction.

This section presents a profile of the entities and employees for all industries that would be affected by OSHA's proposed standard for Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings. OSHA first outlines all industries that would be subject to the proposed standard. Next, OSHA summarizes the number of entities and employees that would be exempt from this proposed standard based on coverage under existing standards, jurisdiction of local or state government entities, or based on one of the exemptions in paragraph (a)(2) of this proposed standard. Lastly, OSHA provides summary statistics for the affected entities[25], including the number of affected entities and the number of affected employees. This information is provided for each industry (1) in total, (2) for small entities as defined by the Regulatory Flexibility Act (RFA) and by the Small Business Administration (SBA), and (3) for very small entities with fewer than 20 employees.

*II. Potentially Affected Industries and Employees***.**

This section characterizes the industries and employees that are likely to be affected by the proposed standard.

A. Potentially Affected Industries.

OSHA broadly characterizes industries that are potentially within the scope of the regulatory framework as core industries[26] and all other covered industries. OSHA

[25] Spreadsheet detailing all calculations discussed in this analysis are available in Analytical Support for OSHA's Preliminary Economic Analysis for the Heat Injury and Illness Prevention (OSHA, 2024c).
[26] To identify core industries, OSHA reviewed multiple sources. The agency reviewed its OSHA Information System (OIS) database to identify industries with fatal and non-fatal heat-related injuries and illnesses. In addition, OSHA identified occupations with the most exposure to heat-related hazards by analyzing (1) occupational information on outdoor work settings from the Occupational Information Network (O*NET) and (2) occupation-level data from the Occupational Requirements Survey (ORS) on

considers core industries to be those industries where employees have the most exposure to heat-related hazards, such as through exposure to high outdoor temperatures, radiant heat sources, or insufficient temperature control or ventilation in indoor work settings. Core industries include:

- Agriculture, Forestry, and Fishing;
- Building Materials and Equipment Suppliers;
- Commercial Kitchens;
- Construction;
- Drycleaning and Commercial Laundries;
- Landscaping and Facilities Support;
- Maintenance and Repair;
- Manufacturing;
- Oil and Gas;
- Postal and Delivery Services;
- Recreation and Amusement;
- Sanitation and Waste Removal;
- Telecommunications;
- Temporary Help Services;
- Transportation;

exposure to process heat. Occupations flagged by those two data sources were then mapped to detailed 2012 North American Industry Classification System (NAICS) codes using the Occupational Employment and Wage Statistics (OEWS). Finally, OSHA evaluated industries that were included in OSHA's National Emphasis Program for Outdoor and Indoor Heat Related Hazards, ANPRM comments, and stakeholder comments.

- Utilities; and
- Warehousing.

While employee exposure to heat-related hazards is expected to be more frequent in the core industries, employees in all other industries within the agency's jurisdiction have the potential to experience occupational heat-related hazards and would also be covered by this proposed standard, with the exception of employers that meet the criteria for one of the scope exemptions in paragraph (a)(2) (discussed in detail in Section VII.A., and below). For example, there are certain jobs, such as maintenance and landscaping occupations, regardless of the industry in which they are performed, that require physical exertion which may increase the risk of heat stress.

Most of the economic data on number of firms, number of establishments, employment[27], and annual receipts are sourced from the Census Bureau's Statistics of U.S. Businesses (SUSB) 2017 dataset (Census Bureau, 2021a). SUSB[28] presents these data[29] by North American Industry Classification System (NAICS) code, employee class size, and state. Unlike most other standards that OSHA proposes, costs will differ not just

[27] For some industry-state combinations, the total employment in the SUSB data was less than the number of establishments. For these cases, OSHA adjusted total employment so that total employment is equal to the number of establishments.
[28] SUSB covers most NAICS industries excluding Crop and Animal Production (NAICS 111, 112); Rail Transportation (NAICS 482); Postal Service (NAICS 491); Pension, Health, Welfare, and Other Insurance Funds (NAICS 525110, 525120, 525190); Trusts, Estates, and Agency Accounts (NAICS 525920); Offices of Notaries (NAICS 541120); Private Households (NAICS 814); and Public Administration (NAICS 92). SUSB also excludes most establishments reporting government employees. (*https://www.census.gov/programs-surveys/susb/about.html*) To the extent that there are some establishments reporting government employees that are also captured in Government Units Survey or the Census of Governments database, OSHA's estimates may overstate the number of covered employees and establishments.
[29] These annual SUSB figures are based on the counts of these variables during the week of March 12th of the reference year.

by industry, but also by the geographical location of workplaces due to variations in environmental conditions. See discussion of geographic location later in this section.

The SUSB glossary (Census Bureau, 2024b) defines the following terms as follows. Establishments are defined as an economic unit, typically a single physical location where business is conducted, services are performed, or industrial operations occur. Firms are legal business organizations and may consist of a single establishment or multiple establishments under common ownership or control. Employment is a measure of paid full- and part-time employees, including employees on paid sick leave, holidays, and vacations.[30] Annual receipts are defined as operating revenue for goods and services summed by industry, net of taxes collected from customers or clients.

There are instances where estimates are left undisclosed in the SUSB dataset because there are only a few companies in a certain industry in a given state. Relying solely on SUSB datafiles would result in an undercount of the potentially affected employers and employees due to the undisclosed data. For this reason, OSHA attempted to fill in these data gaps in these undisclosed industries with alternative data sources. These industries with data gaps are listed below, along with the alternative sources and methods for estimating the number of firms, number of establishments, employment, and annual receipts. OSHA welcomes additional data sources or alternative methodologies to fill these data gaps.

[30] Employment includes salaried officers and executives and excludes sole proprietors and partners of unincorporated businesses.

Agriculture: Most agricultural industries are not included in the SUSB dataset[31], so OSHA used the Department of Agriculture's 2017 Census of Agriculture (USDA, 2019) to derive estimates of the necessary industry profile information. OSHA used the count of farms from Chapter 2, Table 44 "Farms by North American Industry Classification System" to represent the number of establishments for each agricultural industry. OSHA assumed that the number of firms is equal to the number of establishments.[32] OSHA used industry-level estimates of "workers" on hired labor farms and "total sales" from Chapter 1, Table 75 "Summary by North American Industry Classification System" to represent employment counts and annual receipts, respectively. OSHA welcomes feedback on alternative sources, estimation methods, and assumptions for estimations of firms, establishments, and employment in the agricultural sector.

Local Government[33]*:* The SUSB dataset excludes most government entities, including local governments. OSHA primarily relied on data from three alternative sources for local government estimates. To estimate the number of government entities, number of establishments, and employment, OSHA used the county-, city-, and town-level data from the Census Bureau's Government Units Survey (GUS) for 2022 (Census Bureau, 2023d) by state to estimate the number of firms per state. Then, OSHA assumed

[31] The NAICS industries that were estimated using this method are Oilseed and Grain Farming (111100), Vegetable and Melon Farming (111200), Fruit and Nut Tree Farming (111300), Greenhouse, Nursery, and Floriculture (111400), Other Crop Farming (111900), Cattle Ranch and Farming (112100), Hog and Pig Farming (112200), Poultry and Egg Production (112300), Sheep and Goat Farming (112400), Aquaculture (112500), and Other Animal Production (112900).
[32] Family farms account for 96 percent of all U.S. farms (https://www.nass.usda.gov/Newsroom/archive/2021/01-22-2021.php).
[33] In this analysis, OSHA only considered government entities in OSHA state plan states. See Section VIII.B.III.H. later in this section for a discussion of exemptions based on OSHA jurisdiction.

that each entity represented one firm which was equal to one establishment.[34] Since the GUS data do not include estimates for local government employment by state, OSHA used the 2022 Census of Governments' Survey of Public Employment & Payroll local employment data (Census Bureau, 2023b) to develop these estimates. OSHA distributed these local employees based on a ratio of local government employees to population served within each state as provided in the GUS, resulting in an estimate of employment for each local government entity within the GUS. These estimates were summed to the state level for OSHA's analysis.

OSHA's estimate for annual receipts per government entity also required two steps. First, OSHA estimated the average annual receipts per resident by state. The estimate was equal to the ratio of total local government receipts in the datasets found in the Census Bureau's 2021 Annual Survey of State and Local Government Finances (Census Bureau, 2023a) to the total population served in the GUS dataset. Then, OSHA multiplied the population associated with each government entity captured in the GUS with the ratio from step one to arrive at an estimate of total annual receipts per government entity. OSHA again aggregated these estimates to the state level for this analysis.

OSHA welcomes feedback on alternative sources, estimation methods, and assumptions for estimations of firms, establishments, and employment in local governments.

[34] To the extent that there are multiple establishments for a single local government entity, this method underestimates the number of establishments.

State Government: State government entities are excluded from the SUSB dataset, so OSHA relied on two alternative data sources for counts of firms and establishments, employment, and annual receipts. OSHA assumed that each state government is equal to one firm and that each state government firm is equal to one state government establishment.[35]

OSHA used the total state government full-time and part-time employment data from the 2022 Census of Governments' Survey of Public Employment & Payroll (Census Bureau, 2023b) to represent state government employment estimates. OSHA used the state government revenues estimated in the Census Bureau's 2021 Annual Survey of State and Local Government Finances (Census Bureau, 2023a) to estimate annual receipts for state governments.

OSHA welcomes feedback on alternative sources, estimation methods, and assumptions for estimations of firms, establishments, and employment in state governments.

Rail Transportation[36], Postal Service, and Insurance and Employee Benefit Funds: SUSB data relied upon for the majority of the estimates in this industry profile do not include estimates for a small subset of non-agricultural industries: Rail Transportation (NAICS 4821), Postal and Delivery Services (NAICS 4911), and Insurance and

[35] To the extent that state governments have multiple establishments, this method underestimates the number of establishments.

[36] The Federal Railroad Administration (FRA) has promulgated regulations requiring the use of environmental controls to address heat hazards in three specific, limited contexts: non-steam-powered locomotives purchased or remanufactured after June 8, 2012 (49 CFR 229.119(g)), camp cars (49 CFR 228.313(c)), and certain on-track roadway maintenance machines (49 CFR 214.505(a)). OSHA's standard would apply to the working conditions of railroad employees in all other contexts, including within trains and machinery not covered by these regulations and during all outdoor work.

Employment Benefit Funds (NAICS 5251). The economic data estimates for these three industries were derived from the Quarterly Census of Employment and Wages (QCEW) collected by the Bureau of Labor Statistics (BLS). OSHA used industry-level establishment and employment counts by state from the 2022 QCEW dataset (BLS, 2023f). OSHA assumed that each establishment was also a unique firm,[37] thus each firm equals one establishment. While the QCEW does not present revenue data, it does include total annual wages by industry and state. OSHA used the ratio of receipts to wages from the SUSB dataset for each state to convert the QCEW wage data into annual receipts by industry and state.

OSHA welcomes additional data sources or alternative methodologies to fill data gaps in the SUSB data for industries including agriculture, local and state governments. The agency is particularly interested in data and information on the number of firms, establishments, and employment. OSHA has assumed that one establishment is equal to one firm in industries where data on this parameter are not available including in governments, agriculture, postal services, and rail transportation. The agency welcomes comment on this approach and suggestions for alternative approaches.

B. States and Geographic Regions.

[37] To the extent that there are multiple establishments per firm, this will lead to an overestimate. OSHA welcomes feedback on this assumption and information on alternative data sources for the number of firms in these industries.

For this PEA, OSHA categorized states into geographic regions based on the National Weather Service (NWS) regions.[38] Table VIII.B.1. presents the grouping of states into these regions.

Table VIII.B.1. States and Geographic Regions

Alaskan	Central	Eastern	Pacific	Southern	Western
Alaska	Colorado	Connecticut	American Samoa	Alabama	Arizona
	Iowa	Delaware	Guam	Arkansas	California
	Illinois	District of Columbia	Hawaii	Florida	Idaho
	Indiana	Maine	Northern Mariana Islands	Georgia	Montana
	Kansas	Maryland		Louisiana	Nevada
	Kentucky	Massachusetts		Mississippi	Oregon
	Michigan	New Hampshire		New Mexico	Utah
	Minnesota	New Jersey		Oklahoma	Washington
	Missouri	New York		Puerto Rico	Wyoming
	North Dakota	North Carolina		Tennessee	
	Nebraska	Ohio		Texas	
	South Dakota	Pennsylvania		U.S. Virgin Islands	
	Wisconsin	Rhode Island			
		South Carolina			
		Vermont			
		Virginia			
		West Virginia			

Source: NWS, 2024b.

C. Potentially Affected Employees Based on Work Conditions.

OSHA estimated the number of potentially affected employees across all affected industries based on their work conditions. To do so, OSHA used a combination of

[38] In the NWS groupings, three states were divided between two regions: Georgia (Eastern and Southern), Kentucky (Central and Eastern), and Wyoming (Central and Western). OSHA assigned these states to a single region, with Georgia assigned to the Southern region, Kentucky to the Central region, and Wyoming to the Western region.

O*NET, Occupational Requirement Survey (ORS), and Occupational Employment and Wage Statistics (OEWS) program data. Employment is characterized using the Standard Occupational Classification (SOC) detailed occupations (i.e., six-digit SOC code).

O*NET (O*NET, 2023) provides data on the percent of employees in a given occupation that work in certain climatic work conditions for specified frequencies.[39] The climatic work conditions that OSHA evaluated in this analysis are (1) Indoors, Environmentally Controlled; (2) Indoors, Not Environmentally Controlled; (3) Outdoors, Exposed to Weather; and (4) Outdoors, Under Cover. For modeling purposes, OSHA mapped the O*NET frequency categories (O*NET, 2023) to number and percentages of work days worked in certain climatic work conditions, as shown in Table VIII.B.2. For the purposes of this analysis, OSHA assumes that employees in work conditions (2), (3), and (4) are in-scope of the proposed standard unless they meet exemptions discussed later.

Table VIII.B.2. Frequency of Work in Certain Conditions

Category No.	O*Net Frequency Category Name	Minimum number of Days for Category	Maximum Number of Days for Category	Estimated Percentage of Days [a]
1	Never	0	0	0%
2	Less than Monthly	1	<12	2.60%
3	Less than Weekly	12	<50	12.40%
4	Less than Daily	50	<250	60%
5	Every Day	250	250	100%

Sources: Frequency categories are defined by O*NET Online Resource Center (O*NET, 2023). Estimated percentage of days are based on methodology from Park et al. (2021).
[a] These percentages are based on a 250-day work year.

[39] These frequency categories are defined as: (1) “Never;” (2) “Once a year or more but not every month;” (3) “Once a month or more but not every week;” (4) “Once a week or more but not every day;” (5) “Every day.”

There are multiple SOC occupation codes for which the O*NET dataset does not provide the percentages of employees in an occupation for each of these brackets. In these instances, OSHA used the average frequency of work in these conditions from similar SOC occupation codes as representative of the missing SOC occupation code to estimate the frequency of work in these conditions for occupations with missing data.

Using the percentages of each occupation within the frequency categories and the estimated percentages of days worked by category presented in the table above, OSHA estimated the percentage of employees that would be working regularly in certain climatic work conditions by occupation. OSHA then multiplied these percentages by the percentage of total industry employment in a given occupation from the 2022 OEWS dataset (BLS, 2023c). The aggregation of these products by 4-digit NAICS code yields OSHA's estimate of the percentage of all employees in a given industry that work in the four climatic work conditions.

OSHA assumes that employees working indoors in environmentally controlled workspaces are not covered under the proposed standard unless they are exposed to process heat (e.g., kitchens, foundries). It is possible that employees exposed to process heat in indoor work settings are counted in the O*NET data as being in climatic work condition (2) Indoors, Not Environmentally Controlled, and therefore already captured in counts of potentially affected employees. However, to account for the possibility that some employees exposed to process heat are categorized in climatic work condition (1) Indoors, Environmentally Controlled (which is possible if survey respondents considered areas that were environmentally controlled but hot due to process heat to be within the definition of environmentally controlled), OSHA relied on the ORS dataset (BLS, 2023d) to identify occupations exposed to process heat. To the extent that employees exposed to process heat are included in both climatic work condition (2) Indoors, Not Environmentally Controlled and the ORS data on exposure to extreme heat, this method may overstate the number of employees exposed to process heat. The ORS dataset contains estimates for the percent of employees that are exposed (or not) to extreme heat.[40] The ORS data are available by SOC occupation code, although not all SOC codes have an estimate available for all data series. Similar to the estimation for climatic conditions described above, the percentage of employees exposed to extreme heat was multiplied by the percentage of total industry employment in a given occupation from the 2022 OEWS dataset (BLS, 2023c), resulting in an estimate of the percentage of employees by industry exposed to process heat.

OSHA acknowledges that the temperature criteria for the ORS definition of exposure to extreme heat has a higher temperature criterion than the proposed standard's initial heat trigger of 80°F, which, to the extent employees are not otherwise included in this analysis because they are in climatic work condition (2) Indoors, Not Environmentally Controlled, may result in an undercount of employees exposed to process heat.

The percentage of employees exposed to process heat using this method was added to the percentage of employees in exposed climatic conditions to determine the

[40] ORS considers extreme heat present when (1) employees' exposure is related to critical tasks and not due to weather and (2) the atmosphere is dry with temperatures above 90°F, or the atmosphere is humid with temperatures above 85°F (BLS, 2021).

total percentage of employees exposed to heat for all affected industries.[41] To estimate the total number of potentially affected employees for each industry, OSHA multiplied the percentage of total exposed employees in the industry by the OEWS for May 2022 (BLS, 2023c) employment totals for that industry.

Table VIII.B.3. shows a summary of potentially affected firms, establishments, and employees across all these industries by region.

Table VIII.B.3. Industry Profile Summarized by Region

Region	Entities	Establishments	Employees
Alaskan	18,563	21,940	314,444
Central	1,578,125	1,906,757	32,567,699
Eastern	2,157,549	2,631,175	47,954,519
Pacific	33,857	40,139	704,767
Southern	1,776,945	2,205,794	38,771,537
Western	1,432,624	1,720,933	29,839,496
Total	**6,997,663**	**8,526,738**	**150,152,463**

Source: OSHA, based on BLS, 2023c; BLS, 2023f; Census Bureau, 2021a; Census Bureau 2023a; Census Bureau, 2023b; Census Bureau, 2023d; Census Bureau, 2023a; USDA, 2019; and USFA, 2019.

III. Entities Not Covered by the Proposed Standard.

The proposed standard would apply to all employers in the industries outlined in Section VIII.B.II., unless they have a workforce that is exclusively performing work activities that meet one or more of following definitions: (1) work activities for which there is no reasonable expectation of exposure at or above the initial heat trigger; (2) work activities where the employee is exposed to temperatures above the initial heat

[41] To the extent that the employees exposed to process heat are already accounted for as being in one of the affected climatic conditions (indoors-not environmentally controlled, outdoors- exposed to weather, and outdoors- under cover), this method may overestimate the percentage of employees and establishments that are affected by the proposed standard.

trigger for fifteen minutes or less in any sixty-minute period; (3) emergency response activities of workplace emergency response teams or any emergency response activities already covered under 29 CFR 1910.120, 29 CFR 1910.146, 29 CFR 1910.156, 29 CFR 1915 Subpart P, 29 CFR 1926.65, and 29 CFR 1926.1211; (4) work activities performed in indoor work areas or vehicles where air conditioning consistently keeps ambient temperature below 80°F; (5) telework; and (6) sedentary work activities in indoor work areas where the work only involves some combination of the following: sitting, occasional standing and walking for brief periods of time, and occasional lifting of objects weighing less than ten pounds. Employees that are exclusively performing these types of work activities are also exempt from this standard. Where employers and employees are outside OSHA's jurisdiction, they are also not covered by the standard and OSHA's estimates of the types and number of such employers and employees is discussed in this section.

A. Work Activities with No Reasonable Expectation of Exposure at or Above Initial Heat Trigger.

OSHA assumes that the estimates of affected employees covers all employees potentially affected by the proposed standard (reported in Section VIII.B.II.) and excludes those employees who are exempt under the scope exemption for work activities with no reasonable expectation of exposure at or above the initial heat trigger. Employees that are working in "Indoors, Environmentally Controlled" settings as identified by the O*NET data are considered out of scope based on this exemption unless they are also exposed to process heat. OSHA believes that this methodology, combined with the additional exemptions discussed below, removes from scope the employees who would fall under this exemption and thus does not make any additional adjustments for this specific exemption.

B. Short Duration Exposure at or Above Initial Heat Trigger.

To estimate the number of employees that might be exposed to temperatures at or above the initial heat trigger for fifteen minutes or less in any sixty-minute period, OSHA relied on the ORS dataset. For indoor work settings, OSHA used the percentages of employees not exposed to extreme heat and the percentage of employees seldomly[42] exposed to extreme heat as reflective of those employees that are exposed to temperatures at or above the initial heat trigger for fifteen minutes or less in any sixty-minute period. For outdoor work settings, OSHA used the percentages of employees that either do not work outdoors or seldomly work outdoors to estimate the number of employees exposed to temperatures at or above the initial heat trigger for fifteen minutes or less in any sixty-minute period. OSHA added the percentages for each SOC occupation code (OSHA, 2024d).

Using the 2022 OEWS data (BLS, 2023c) described in Section VIII.B.II., OSHA multiplied the percentage of total industry employment in a given occupation and the summation of the percentages of employees in that same occupation that are either not exposed or seldomly exposed to extreme heat to estimate the percentage of employees in an SOC occupation code in a certain industry that meet the exemption criteria for indoor

[42] ORS defines seldom as spending up to two percent of total time working in extreme heat, or less than ten minutes daily, less than 45 minutes weekly, or less than one week annually (BLS, 2021).

employees. These estimates were aggregated for each 4-digit NAICS industry to estimate the percentage of total employment in that industry that is exposed to temperatures at or above the initial heat trigger for fifteen minutes or less in any sixty-minute period. For 4-digit NAICS industries otherwise captured in OSHA's economic analysis that are not available in the OEWS dataset, OSHA used the average percentage of employees meeting this definition within the same industry sector (2-digit NAICS). This same process also applies for the percentages of employees that either do not work outdoors or seldomly work outdoors.

Table VIII.B.4. shows the number of employees that OSHA estimates are exempt from the proposed standard because of qualification as employees with only short duration exposure.

Table VIII.B.4. Summary of Employees Exempt due to Short Duration Exposure

Region	Indoor Employees	Outdoor Employees
Alaskan	199,838	27,312
Central	21,511,842	2,957,214
Eastern	32,085,256	4,285,342
Pacific	458,099	66,205
Southern	25,520,407	3,497,694
Western	19,598,994	2,676,549
Total	**99,374,435**	**13,510,315**

Source: OSHA, based on Census Bureau, 2021a; USDA, 2019; Census Bureau, 2023a; Census Bureau, 2023d; USFA, 2023; BLS, 2023c; and BLS, 2023d.

Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

C. Emergency Response Activities.

OSHA's proposed standard exempts organizations whose primary function is the performance of firefighting; emergency response activities of workplace emergency response teams, emergency medical services, or technical search and rescue; and any emergency response activities already covered under 29 CFR 1910.120, 29 CFR 1910.146, 29 CFR 1910.156, 29 CFR 1915 Subpart P, 29 CFR 1926.65, and 29 CFR 1926.1211. See the *Explanation of the Proposed Requirement* for Paragraph (a) Scope for a full discussion of this exemption.[43]

To identify exempt career firefighters, OSHA used the U.S. Fire Administration's National Fire Department Registry (USFA, 2023) to determine the number of firefighters in each state. Each fire department recorded in the National Fire Department Registry is considered a firm in the industry profile and each fire station is considered an establishment. Employment figures are based on the aggregation of counts of active career firefighters. Volunteer and paid-per-call firefighters are not included as employees in the data on government employees that form the basis of OSHA's estimates of government employees, so no adjustment was made to employment regarding these responders. (See OSHA-2007-0073-0118, Chapter VII, for additional information). OSHA welcomes comment on these estimates including whether there are additional types of establishments or employees who should be considered out of scope for this analysis and suggestions on methodologies that could better represent this exemption.

D. Sedentary Work Activities at Indoor Work Areas.

To estimate the number of employees engaged in indoor sedentary work activities as defined in the proposed standard, OSHA used ORS and OEWS data. The ORS dataset

[43] OSHA did not attempt to adjust the share of employee's time spent engaged in emergency response activities and aside from firefighters, did not remove any employees from the scope of the standard due to this exemption. To the extent that there are additional establishments where employees exclusively perform emergency response activities, this analysis may overstate the number of affected establishments and employees.

includes estimates for the percent of employees involved in work where the strength required is considered sedentary.[44] These data are available by SOC code, although not all codes have an estimate available for all data series.

As described in Section VIII.B.III.B., OEWS provides employment data for all SOC occupation codes within each 4-digit NAICS industry. OSHA multiplied the percentage of total industry employment in a given occupation by the percentage of employees in a given SOC code considered sedentary (OSHA, 2024d). Similar to the estimates for short duration exposure, these percentages were aggregated for each 4-digit NAICS industry to estimate the percentage of total employment in that NAICS industry that is considered sedentary. For 4-digit NAICS industries otherwise captured in OSHA's economic analysis that are not available in the OEWS dataset, OSHA used the average percentage of employees meeting this definition within the same sector.

Table VIII.B.5. shows the number of employees that OSHA estimates are exempt from the proposed standard because their work is sedentary.

Table VIII.B.5. Summary of Sedentary Employees Exempt from the Proposed Standard

Region	Employees
Alaskan	66,112
Central	7,236,687
Eastern	11,038,630
Pacific	142,075
Southern	8,543,839
Western	6,830,356
Total	**33,857,699**

Source: OSHA, based on Census Bureau, 2021a; USDA, 2019; Census Bureau, 2023a; Census Bureau, 2023d; USFA, 2023; BLS, 2023c; and BLS, 2023d.
Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

[44] Sedentary work involves less than or equal to one-third of the workday standing while only seldomly or occasionally lifting or carrying up to ten pounds.

E. Telework.

To estimate the number of employees working remotely, OSHA used the 2022 BLS Business Response Survey (BRS) data (BLS, 2024a) on telework. The BRS provides percentages of employment by sector that are working remotely, on-site (i.e., non-remote work), or hybrid. OSHA applied these percentages of employment by sector to the employment data derived from the sources outlined in Section VIII.B.II. Remote employees are considered exempt from the proposed standard and hybrid employees are considered exempt from the proposed standard during the time they are teleworking.

Table VIII.B.6. shows the number of employees that OSHA estimates work remotely, hybrid, and on-site.

Table VIII.B.6. Summary of On-Site, Remote, and Hybrid Employees

Region	Remote	Hybrid	On-Site
Alaskan	9,933	93,485	206,311
Central	1,100,860	10,324,319	20,885,970
Eastern	1,716,903	15,412,798	30,383,027
Pacific	22,912	195,421	483,328
Southern	1,391,099	12,060,519	25,087,691
Western	1,100,879	9,289,249	19,318,010
Total	**5,342,586**	**47,375,792**	**96,364,336**

Source: OSHA, based on BLS 2024a; Census Bureau, 2021a; Census Bureau, 2023a; Census Bureau, 2023d; USDA, 2019; and USFA, 2023
Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

F. Indoor Work Areas Where Temperature is Maintained Below 80°F.

To estimate the number of establishments that might qualify as having indoor work areas where the ambient temperature is maintained below 80°F (26.7°C), OSHA used the Energy Information Administration (EIA) Commercial Buildings Energy Consumption Survey (CBECS) data (EIA, 2022). The CBECS data provide estimates on the number of buildings by building activity with some percentage of cooled floorspace.

OSHA assumed that buildings with at least 51 percent of floorspace cooled qualify as establishments where work activities take place in ambient temperatures below 80°F (26.7°C). OSHA assumed that employees likely work in environmentally controlled areas of buildings regardless of what percent of floorspace is cooled. For example, loading docks, storage areas, or areas where processes are automated may not be cooled but they also may not be regular work locations for employees.[45] OSHA mapped these building activities to sectors to estimate the percentage of establishments in a given sector that would fit the definition of this exemption. These estimates were applied to the number of establishments, as well as the number of firms, to determine those firms and establishments that are exempt from the proposed standard based on this exemption. OSHA welcomes comment on whether this is a reasonable assumption. If not, the agency welcomes comment on more appropriate methodologies or data source that might better allow OSHA to estimate which establishments would be covered by this proposed standard.

Table VIII.B.7. shows the number of firms and establishments where the ambient temperature indoors is maintained below 80°F (26.7°C).

[45] To the extent this assumption is incorrect, this may result in too few establishments being considered in-scope of this proposed standard which potentially underestimates total establishment-based costs. However, this adjustment does not affect the number of covered employees who are included or excluded based on their job characteristics. The estimated employees who are covered by this proposed standard are distributed among the covered establishments. If OSHA is counting too few establishments as covered, this would mean that the affected employees are concentrated into fewer establishments than they truly are and the average cost per establishment may be too high.

Table VIII.B.7. Summary of Entities and Establishments with Sufficient Environmental Controls

Region	Entities	Establishments
Alaskan	11,047	13,469
Central	883,924	1,142,591
Eastern	1,362,384	1,739,119
Pacific	20,783	25,630
Southern	1,096,146	1,428,219
Western	922,625	1,146,582
Total	**4,296,908**	**5,495,610**

Source: OSHA, based on Census Bureau, 2021a; Census Bureau, 2023a; Census Bureau, 2023d; EIA, 2022; USDA, 2019; and USFA, 2023.
Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

G. Employees Working in Cooled Vehicles.

To estimate the number of employees working in cooled vehicles, OSHA first estimated the percentage of employees working in vehicles by NAICS code. The estimated percentage of drivers is based on the percentage of total industry employment in occupations that involve driving. OSHA acknowledges that some non-driving occupations may work in vehicles and assumes that these occupations are already captured in estimates of other work conditions (e.g., they may be included in the group working indoors in environmentally controlled settings or working outdoors in covered areas). OSHA determined that the following SOC occupation codes represent occupations that involve driving vehicles exposed to outdoor heat conditions for most of their work activities:

- Postal Service Mail Carriers (43-5052);
- Agricultural Equipment Operators (45-2091);
- Paving, Surfacing, and Tamping Equipment Operators (47-2071);
- Pile Driver Operators (47-2072);

- Operating Engineers and Other Construction Equipment Operators (47-2073);
- Ambulance Drivers and Attendants, Except Emergency Medical Technicians (53-3011);
- Driver/Sales Workers (53-3031);
- Heavy and Tractor-Trailer Truck Drivers (53-3032);
- Light Truck Drivers (53-3033);
- Bus Drivers, School (53-3051);
- Bus Drivers, Transit and Intercity (53-3052);
- Shuttle Drivers and Chauffeurs (53-3053);
- Taxi Drivers (53-3054); and
- Refuse and Recyclable Material Collectors (53-7081).

OSHA then multiplied the percentage of total industry employment comprised of these SOC occupation codes by the percentage of drivers in vehicles with sufficiently cooled vehicle cabs. In the absence of data on the percentage of vehicles with sufficiently cooled vehicle cabs, OSHA estimates that 34 percent of postal service (Hooker and Baker, 2023) and assumes that 50 percent of all other delivery service drivers work in sufficiently cooled vehicle cabs. OSHA welcomes additional data on the percent of vehicle cabs that are sufficiently cooled for all types of drivers.

Table VIII.B.8. shows the total number of employees working as drivers and those OSHA estimates to be in-scope (i.e., those who are not working in sufficiently cooled vehicle cabs).

Table VIII.B.8. Summary of Drivers, Total and In-Scope

Region	Drivers	In-Scope Drivers
Alaskan	10,572	5,419
Central	1,062,955	543,165
Eastern	1,501,620	768,853
Pacific	21,039	10,736
Southern	1,249,063	637,255
Western	963,917	490,865
Total	**4,809,165**	**2,456,292**

Source: OSHA, based on Census Bureau, 2021a; Census Bureau, 2023a; U.S. Census Bureau, 2023d; Hooker and Baker, 2023; USDA, 2019; and USFA, 2023.
Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

H. Exemptions based on OSHA Jurisdiction.

Beyond the exemptions laid out in the scope section of the proposed regulatory text, OSHA must factor in jurisdictional considerations when determining those establishments and employees that are in scope of the proposed standard. A subset of public entities is considered in-scope depending on whether or not the public entity is located in an OSHA State Plan state. Those public entities that are in non-State Plan states, as well as their employees, are considered out of scope. The following states and territories have State Plans[46]: Alaska, Arizona, California, Connecticut, Hawaii, Illinois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Nevada, New Jersey, New Mexico, New York, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, U.S. Virgin Islands, Utah, Vermont, Virginia, Washington, and Wyoming.

I. Summary of Exempt Employees.

[46] Seven of these—Connecticut, Illinois, Maine, Massachusetts, New Jersey, New York, and U.S. Virgin Islands—only cover public sector employees. The private sector employees in those states are covered by federal OSHA and have been included in this analysis.

Table VIII.B.9. summarizes the total number of employees estimated to be exempt from the proposed standard by each exemption. OSHA welcomes comment and feedback on whether the approaches detailed above used to estimate the number of employees affected by the proposed standard's exemptions are appropriate. The agency welcomes additional data or information on how to appropriately account for the exemptions in the proposed standard.

Table VIII.B.9. Summary of Employees by Exemption Type by Region

Region	Indoor Short Duration	Outdoor Short Duration	Sedentary	Remote	Hybrid	Drivers
Alaskan	199,838	27,312	66,112	9,933	93,485	5,153
Central	21,511,842	2,957,214	7,236,687	1,100,860	10,324,319	519,790
Eastern	32,085,256	4,285,342	11,038,630	1,716,903	15,412,798	732,767
Pacific	458,099	66,205	142,075	22,912	195,421	10,302
Southern	25,520,407	3,497,694	8,543,839	1,391,099	12,060,519	611,808
Western	19,598,994	2,676,549	6,830,356	1,100,879	9,289,249	473,052
Total	**99,374,435**	**13,510,315**	**33,857,699**	**5,342,586**	**47,375,792**	**2,352,873**

Source: OSHA, based on BLS, 2023c; BLS, 2023d; BLS, 2024a; Census Bureau, 2021a; Census Bureau, 2023a; Census Bureau, 20203b; Hooker and Baker, 2023; USDA, 2019; and USFA, 2023.
Note: Many employees fit multiple exemption types outlined in this table. The total number of exempt employees is less than the summation of employees across all exemption types. Due to rounding, figures in the columns and rows may not sum to the totals shown.

OSHA welcomes comment and feedback on whether these approaches to estimate the number of employees affected by the proposed standard's exemptions are appropriate. The agency welcomes additional data or information on how to appropriately account for the exemptions in the proposed standard.

IV. Affected Employees.

The categories that employees impacted by the proposed exemptions fall into are likely to overlap. Employees that perform office work may (1) work indoors in climate control, (2) only perform sedentary work activities, and (3) may occasionally work remotely. In these situations, such employees may be included in the total estimate for each of these exemptions discussed above, therefore simply adding the totals of those exemptions may overstate the number of exempt employees. This section adjusts for that overlap and presents the number of estimated employees by work condition. This section also presents estimates on the number of affected employees by work shift which is used for specific cost estimates discussed in Section VIII.C., Costs of Compliance.

A. Affected Employees by Work Conditions.

This section estimates the percentage of affected employees by work conditions, using the number of employees potentially exposed to heat from Section VIII.B.II. and the exemptions outlined in Section VIII.B.III. OSHA recognizes that some employees are likely to fall under multiple exemptions. For example, an employee that teleworks and performs sedentary work in a climate-controlled environment is included in three exemption categories (telework, sedentary, and no reasonable expectation of exposure to heat). To avoid double-counting employees, OSHA relied on the following method to estimate the number of affected employees.

First, the agency excluded public-sector employees that are not within OSHA's jurisdiction, as discussed in Section VIII.B.III.H. After excluding employees outside OSHA's jurisdiction, the agency applied the estimated percentages of employees engaged in sedentary work, as estimated in Section VIII.B.III.D., to the percentage of employees working in indoor, not environmentally controlled work conditions since those employees performing sedentary work indoors are exempt regardless of the presence of climate control. OSHA assumes that the majority of employees estimated to be exempt due to telework, detailed in Section VIII.B.III.E., are also captured by the sedentary work exemption, and therefore did not make an additional adjustment for these employees.

Next, OSHA applied the estimated percentage of employees exposed to extreme heat according to the ORS data (BLS, 2023d) to the percentage of employees working in indoor, environmentally controlled work conditions to account for employees exposed to process heat who are covered by this proposed standard. The percentages of outdoor employees (both under cover and exposed to weather) are adjusted to remove from scope employees that have short duration outdoor exposure as estimated in Section VIII.B.III.B. OSHA assumed that indoor employees that are exempt based on short duration exposure are likely to be captured in the sedentary work exemption and did not make an additional adjustment for these employees.

These percentages were aggregated for each 4-digit NAICS industry to estimate the percentage of total employment in that industry that work in either indoor, environmentally controlled conditions (while only accounting for those employees that are exposed to process heat); indoor, not environmentally controlled conditions (while only accounting for those employees that are not sedentary); or outdoor conditions. For 4-digit NAICS industries otherwise captured in OSHA's economic analysis that are not available in the OEWS dataset, OSHA used the average percentage of employees meeting these definitions within the same sector.

Table VIII.B.10. shows the number of employees that are considered within the scope of the proposed standard, broken out by work conditions.

Table VIII.B.10. Summary of Employees by Work Condition

Region	Indoor, Not Environmentally Controlled	Indoor, Process Heat	Outdoor	Total
Alaskan	38,078	6,240	39,652	83,969
Central	4,119,613	688,813	3,110,084	7,918,510
Eastern	5,677,620	1,011,200	4,545,121	11,233,941
Pacific	80,274	19,346	74,030	173,649
Southern	4,473,460	822,673	3,448,321	8,744,454
Western	3,780,957	665,729	3,353,115	7,799,801
Total	**18,170,002**	**3,214,001**	**14,570,322**	**35,954,325**

Source: OSHA, based on BLS, 2023d; Census Bureau, 2021a; Census Bureau, 2023a; Census Bureau, 2023d; O*NET, 2023; USDA, 2019; and USFA, 2023.
Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

B. Affected Employees by Shift Type.

To estimate the number of employees that work during certain periods of the day and therefore during different heat conditions, OSHA used the American Time Use Survey (ATUS) for 2017–2018 (BLS, 2023a). The ATUS outlines the percent of employees that work certain shifts by sector. For the purposes of estimating the variations in heat exposure over the course of a day, OSHA has categorized these into three shifts: daytime, evening, and overnight. OSHA mapped work shifts defined in the ATUS to these three categories in the following sections.

I. Daytime.

The daytime work shift category corresponds to the regular daytime schedule grouping in the ATUS. The ATUS defines regular daytime schedule as having a majority of respondents that worked between 6:00 a.m. and 6:00 p.m. For this analysis, employees categorized as daytime employees are assumed to work between 8:00 a.m. and 4:00 p.m. to adjust for overlap with the other work shift categories.

II. Evening.

The evening work shift category corresponds to the evening shift in the ATUS. The evening schedule is defined as having respondents work a majority of the time between 2:00 p.m. and midnight. For this analysis, employees categorized as evening employees are assumed to work between 4:00 p.m. and midnight.

III. Overnight.

The overnight work shift category corresponds to the night shift in the ATUS. The night schedule is defined as having respondents work a majority of the time between 9:00 p.m. and 8:00 a.m. For this analysis, employees categorized as overnight employees are assumed to work between midnight and 8:00 a.m.

IV. Other Shift Categories.

There are additional shift groups in the ATUS whose definitions do not fit neatly into a certain timeframe (e.g., rotating, irregular, split shift, other). The percentages of employees that fit these additional groups were evenly distributed across the other categories.

V. Estimates of the Number of In-Scope Employees by Work Shift.

Estimating the number of employees that work certain shifts is important because some requirements of the proposed standard are dependent on whether the heat index is at or above a trigger while employees are working. Employees working in the early afternoon will be exposed to warmer temperatures than those working during the evening or night hours, and thus will more often qualify for a required rest break, as an example.

Table VIII.B.11. shows the number of employees that OSHA estimates work certain work shifts.

Table VIII.B.11. Summary of In-Scope Employees by Work Shift and Work Condition

Region	Indoor, Not Environmentally Controlled	Indoor, Process Heat	Outdoor	Total
Daytime				
Alaskan	32,572	4,683	34,729	71,985
Central	3,520,992	513,412	2,727,273	6,761,677
Eastern	4,858,352	752,843	3,989,031	9,600,226
Pacific	67,919	13,914	64,780	146,614
Southern	3,837,670	601,003	3,046,594	7,485,266
Western	3,241,443	492,814	2,952,787	6,687,044
Subtotal	**15,558,949**	**2,378,669**	**12,815,194**	**30,752,813**
Evening				
Alaskan	3,151	1,114	2,643	6,908
Central	344,832	126,294	211,761	682,888
Eastern	476,846	186,505	309,284	972,635
Pacific	7,580	4,029	5,298	16,906
Southern	376,759	163,150	228,820	768,729
Western	315,621	125,450	221,400	662,471
Subtotal	**1,524,789**	**606,543**	**979,205**	**3,110,537**
Overnight				
Alaskan	2,355	442	2,280	5,076
Central	253,789	49,106	171,050	473,945
Eastern	342,421	71,853	246,806	661,079
Pacific	4,774	1,403	3,952	10,129
Southern	259,031	58,520	172,907	490,459
Western	223,893	47,465	178,928	450,287
Subtotal	**1,086,263**	**228,789**	**775,922**	**2,090,975**
Total				
Alaskan	38,078	6,240	39,652	83,969
Central	4,119,613	688,813	3,110,084	7,918,510
Eastern	5,677,620	1,011,200	4,545,121	11,233,941
Pacific	80,274	19,346	74,030	173,649
Southern	4,473,460	822,673	3,448,321	8,744,454
Western	3,780,957	665,729	3,353,115	7,799,801
Total	**18,170,002**	**3,214,001**	**14,570,322**	**35,954,325**

Source: OSHA, based on BLS, 2023a; BLS, 2023c; BLS 2023d; Census Bureau, 2021a; Census Bureau, 2023a; Census Bureau, 203d; O*NET, 2023; USDA, 2019; and USFA, 2023.
Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

V. Affected Entities.

This section summarizes the total estimated number of entities, small entities, and very small entities impacted by the proposed standard.

A. Summary of Affected Entities.

Table VIII.B.12. summarizes the number of affected entities by core industry and region.

Table VIII.B.12. Profile of Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Entities	Establishments	Employees
Agriculture, Forestry, and Fishing			
Alaskan	483	490	892
Central	35,466	35,586	281,481
Eastern	18,684	18,729	160,691
Pacific	253	253	1,666
Southern	32,393	32,534	237,522
Western	18,176	18,287	453,041
Subtotal	**105,455**	**105,879**	**1,135,293**
Building Materials and Equipment Suppliers			
Alaskan	38	51	1,142
Central	2,912	4,090	105,785
Eastern	4,280	5,858	131,370
Pacific	72	93	2,030
Southern	3,692	5,338	122,798
Western	2,889	3,876	92,573
Subtotal	**13,884**	**19,306**	**455,698**
Commercial Kitchens			
Alaskan	517	623	6,270
Central	36,975	49,684	739,565
Eastern	66,334	83,069	1,100,671
Pacific	1,353	1,605	23,824
Southern	43,422	60,794	987,885
Western	39,486	52,286	733,222
Subtotal	**188,087**	**248,060**	**3,591,437**
Construction			
Alaskan	2,468	2,518	11,776
Central	161,546	163,268	867,865
Eastern	234,565	236,970	1,264,969
Pacific	3,436	3,477	24,954
Southern	168,126	171,053	1,232,019
Western	155,060	157,053	947,205

Table VIII.B.12. Profile of Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Entities	Establishments	Employees
Subtotal	**725,200**	**734,340**	**4,348,789**
Drycleaning and Commercial Laundries			
Alaskan	18	20	114
Central	1,994	2,485	13,861
Eastern	5,711	6,383	25,423
Pacific	43	50	554
Southern	3,145	3,767	20,037
Western	2,396	2,706	14,349
Subtotal	**13,307**	**15,411**	**74,338**
Landscaping and Facilities Support			
Alaskan	111	127	4,334
Central	11,606	13,203	273,784
Eastern	18,686	21,487	443,136
Pacific	238	313	8,574
Southern	13,103	15,123	367,104
Western	9,836	11,827	262,938
Subtotal	**53,581**	**62,080**	**1,359,870**
Maintenance and Repair			
Alaskan	189	217	1,291
Central	20,398	21,964	143,311
Eastern	27,230	29,112	185,126
Pacific	329	350	2,261
Southern	21,642	23,646	172,454
Western	17,080	18,515	129,094
Subtotal	**86,868**	**93,804**	**633,538**
Manufacturing			
Alaskan	174	207	3,489
Central	31,890	34,082	1,149,535
Eastern	37,652	39,539	1,064,032
Pacific	307	316	3,243
Southern	27,569	29,654	852,094
Western	26,893	28,053	551,798
Subtotal	**124,483**	**131,849**	**3,624,192**
Oil and Gas			
Alaskan	72	98	3,809
Central	3,210	3,976	27,709
Eastern	1,631	2,146	18,110
Pacific	0	0	0
Southern	11,216	14,406	173,419
Western	1,794	2,110	18,053
Subtotal	**17,924**	**22,736**	**241,099**
Postal and Delivery Services			

Table VIII.B.12. Profile of Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Entities	Establishments	Employees
Alaskan	207	229	273
Central	8,796	9,820	48,711
Eastern	11,053	12,421	77,808
Pacific	112	131	776
Southern	7,782	9,144	55,205
Western	4,874	5,860	46,414
Subtotal	**32,824**	**37,605**	**229,188**
Recreation and Amusement			
Alaskan	261	272	1,156
Central	9,879	10,799	117,890
Eastern	14,551	16,161	196,438
Pacific	185	200	2,558
Southern	9,316	10,524	153,835
Western	7,815	9,004	138,003
Subtotal	**42,006**	**46,961**	**609,880**
Sanitation and Waste Removal			
Alaskan	19	22	691
Central	648	815	21,373
Eastern	982	1,176	36,177
Pacific	15	18	635
Southern	642	853	28,844
Western	441	576	22,484
Subtotal	**2,747**	**3,460**	**110,204**
Telecommunications			
Alaskan	7	30	619
Central	418	1,853	32,035
Eastern	532	2,536	48,653
Pacific	6	28	580
Southern	479	2,227	44,194
Western	384	1,554	28,506
Subtotal	**1,825**	**8,228**	**154,587**
Temporary Help Services			
Alaskan	6	9	363
Central	910	1,623	340,619
Eastern	1,469	2,286	435,338
Pacific	14	22	10,226
Southern	1,192	1,941	704,748
Western	837	1,395	382,328
Subtotal	**4,428**	**7,276**	**1,873,621**
Transportation			
Alaskan	515	645	4,950
Central	36,839	39,510	214,151

Table VIII.B.12. Profile of Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Entities	Establishments	Employees
Eastern	32,523	35,567	218,252
Pacific	374	443	7,332
Southern	31,794	36,180	290,503
Western	23,246	25,732	170,998
Subtotal	**125,290**	**138,077**	**906,187**
Utilities			
Alaskan	59	98	817
Central	1,481	4,192	61,651
Eastern	1,628	5,255	86,266
Pacific	20	36	336
Southern	2,678	5,894	73,865
Western	1,470	3,002	41,136
Subtotal	**7,336**	**18,477**	**264,071**
Warehousing			
Alaskan	21	22	126
Central	2,247	3,195	74,468
Eastern	2,877	4,040	109,065
Pacific	42	51	452
Southern	2,631	3,966	92,288
Western	2,068	3,000	70,103
Subtotal	**9,887**	**14,274**	**346,503**
Non-Core			
Alaskan	1,907	2,218	41,857
Central	138,849	171,223	3,404,715
Eastern	221,457	269,307	5,632,414
Pacific	3,497	4,224	83,648
Southern	169,479	211,935	3,135,642
Western	140,429	169,045	3,697,556
Subtotal	**675,618**	**827,952**	**15,995,832**
Total			
Alaskan	7,073	7,895	83,969
Central	506,064	571,365	7,918,510
Eastern	701,843	792,041	11,233,941
Pacific	10,295	11,611	173,649
Southern	550,301	638,982	8,744,454
Western	455,175	513,879	7,799,801
Total	**2,230,750**	**2,535,774**	**35,954,325**

Source: OSHA, based on Census Bureau, 2021a; USDA, 2019; Census Bureau, 2023a; Census Bureau, 2023d; and USFA, 2023.
Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

B. Determining Entity Size.

OSHA also estimates the number of firms, establishments, and employees that are considered small by both SBA regulations in 13 CFR 121.201 and the Regulatory Flexibility Act (RFA). Private entities are defined as small according to various employment- or revenue-based definitions by 6-digit NAICS code as laid out in the SBA table of size standards (SBA, 2023). Public entities (or "small governments") are defined as small if they serve a population of less than 50,000.[47] OSHA also looks at the economic impacts on very small entities, which, for all industries, the agency defines as those employing fewer than 20 employees.

For this PEA, OSHA analyzed costs at the 4-digit NAICS code and state level. Since there are no SBA definitions of small entities at the 4-digit level, OSHA aggregated the number of firms, establishments, and employees within each 6-digit NAICS industry to the 4-digit level. For employee-based SBA definitions, OSHA summed all economic data within employee-class sizes below the SBA-determined cut-off number of employees. For revenue-based definitions, OSHA summed all economic data for all employee-class sizes under the largest employee-class size where the average revenue per firm was under the SBA-determined cut-off revenue. Where available, SUSB data is used

[47] The RFA also includes small organizations defined as any not-for-profit enterprise which is independently owned and operated and is not dominant in its field. Traditionally, OSHA considers all non-profit organizations to be small entities based on this definition. This has the effect of including some very large organizations in the analysis of small entities (e.g., some major hospital systems with tens of thousands of employees are non-profit entities) thus skewing the costs and impacts for the average small entity. For this analysis, OSHA did not separately assess impacts on non-profit entities. To the extent that non-profit entities are similar in size to small for-profit entities (either based on the number of employees or revenues), the costs and impact estimates would be consistent. The costs of this proposed standard are largely employee based and the agency has not found there to be feasibility concerns for entities of any size. Including large non-profits in the profile of SBA/RFA defined small entities would not alter the findings of the Initial Regulatory Flexibility Analysis (See Section VIII.F.).

to estimate firms, establishments, and employees by size class. As discussed in Section VIII.B.II., there are some NAICS industries that are unavailable in the SUSB, so OSHA used alternative data sources, as discussed in Section VIII.B.II.A., to estimate employment and establishment counts by size class in those instances.

For the private sector industries that were missing from the SUSB dataset due to data disclosure limitations, OSHA estimated the percentage of employment and establishments in each size class category using SUSB data where available for the sector and then applied that to the total counts of employment and establishments described in Section VIII.B.II. OSHA used data from the Census of Agriculture (USDA, 2019) to estimate the industry characteristics for NAICS industries within the agriculture sector and QCEW data for the remaining NAICS industries that were missing size class information due to data disclosure limitations.

Local government data were drawn from the Census Bureau’s (2023) GUS data for 2022 (BLS, 2023d). The data include the 2021 population of each city, county, and town served by the listed local governments. Using the GUS data, OSHA found that, of the 38,736 local governments listed, 18,028 are in State Plan states and 16,893 of these have a population of less than 50,000 and are, thus, considered small. No state governments are considered small under the RFA definition.

Based on the exemption for emergency response activities, OSHA estimated the number of fire departments that serve small governmental jurisdictions and the number of firefighters that they employ. To derive these estimates, OSHA estimated the median population served per fire department employee and used that to estimate how many employees a department would need to employ to serve a population greater than 50,000. OSHA used data from two Firehouse Magazine surveys to determine the median population served per employee for career and mixed fire departments at various employment size classes to extrapolate to the entire universe of fire departments. Part 1 of the 2021 National Run Survey (Firehouse Magazine, 2022b) presents data from 229 career fire departments' statistics about population and staffing. Similarly, the 2021 Combination Fire Department Run Survey (Firehouse Magazine, 2022a) has mixed fire department data. Estimates of the median population served per employee derived from both surveys are multiplied by the number of employees for each department in the U.S. Fire Administration's (USFA, 2022) registry data (used for the Fire Department profile (see Section VIII.B.II.)) within each employee size class to determine how many departments serve populations of fewer than 50,000. These estimated counts of employees and fire departments corresponding to those departments were removed from the count of employees, entities, and establishments at affected small governments.

C. Summary of Small and Very Small Entities.

Table VIII.B.13. presents the number of small firms and establishments and the number of very small firms and establishments, as well as the number of employees estimated to work for these small and very small entities. In some industries with revenue-based SBA thresholds for small entities, the counts of small affected firms (establishments) are less than the counts for very small firms (establishments). This occurs when some very small firms (establishments) have revenue that exceeds the small entity revenue threshold and are therefore not included in the counts of small firms (establishments).

Table VIII.B.13. Profile of Small and Very Small Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Small (SBA/RFA)			Very Small (<20)		
	Entities	Establishments	Employees	Entities	Establishments	Employees
Agriculture, Forestry, and Fishing						
Alaskan	475	478	831	466	466	544
Central	24,294	24,322	149,091	15,065	15,065	55,208
Eastern	16,193	16,208	115,421	12,736	12,738	53,826
Pacific	199	199	1,399	138	138	1,082
Southern	26,346	26,377	169,979	17,326	17,331	62,951
Western	16,211	16,268	314,889	10,009	10,012	58,338
Subtotal	**83,717**	**83,853**	**751,608**	**55,739**	**55,750**	**231,950**
Building Materials and Equipment Suppliers						
Alaskan	14	15	216	27	27	202
Central	1,192	1,282	25,975	2,192	2,231	18,113
Eastern	1,999	2,128	40,838	3,358	3,409	27,914
Pacific	38	41	679	52	52	395
Southern	1,814	1,946	34,426	2,855	2,898	23,385
Western	1,509	1,596	28,722	2,311	2,345	18,858
Subtotal	**6,566**	**7,009**	**130,856**	**10,795**	**10,962**	**88,866**
Commercial Kitchens						
Alaskan	509	579	4,603	430	432	1,745
Central	36,119	40,201	472,283	26,822	26,939	130,727
Eastern	65,298	69,963	724,441	51,676	51,830	233,251
Pacific	1,282	1,388	16,812	946	949	4,411
Southern	42,239	47,058	571,817	31,027	31,159	145,802
Western	38,954	43,511	487,920	29,838	30,051	149,486
Subtotal	**184,402**	**202,700**	**2,277,876**	**140,740**	**141,361**	**665,422**
Construction						
Alaskan	2,383	2,400	6,784	2,277	2,279	4,532
Central	158,425	158,752	562,118	147,997	148,028	315,449

Table VIII.B.13. Profile of Small and Very Small Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Small (SBA/RFA)			Very Small (<20)		
	Entities	Establishments	Employees	Entities	Establishments	Employees
Eastern	230,158	230,528	840,221	214,268	214,313	467,181
Pacific	3,308	3,317	15,761	2,986	2,986	8,179
Southern	163,896	164,295	695,987	149,782	149,827	359,212
Western	151,930	152,258	602,318	140,362	140,392	322,939
Subtotal	**710,101**	**711,550**	**2,723,189**	**657,671**	**657,825**	**1,477,491**
Drycleaning and Commercial Laundries						
Alaskan	17	19	95	16	17	69
Central	1,929	2,171	8,814	1,754	1,797	4,391
Eastern	5,626	5,994	17,624	5,330	5,438	10,761
Pacific	39	41	313	32	34	83
Southern	3,087	3,449	12,989	2,843	2,951	7,977
Western	2,352	2,501	8,319	2,214	2,268	5,138
Subtotal	**13,051**	**14,174**	**48,155**	**12,190**	**12,506**	**28,419**
Landscaping and Facilities Support						
Alaskan	105	109	1,938	98	99	860
Central	11,364	11,974	165,112	10,565	10,796	82,930
Eastern	18,330	19,096	270,325	17,103	17,308	131,677
Pacific	223	250	5,027	202	203	2,067
Southern	12,805	13,271	200,425	11,867	11,974	101,006
Western	9,634	9,974	152,217	8,953	9,030	77,219
Subtotal	**52,461**	**54,673**	**795,043**	**48,789**	**49,410**	**395,758**
Maintenance and Repair						
Alaskan	174	186	1,055	174	176	821
Central	19,068	19,653	108,461	19,174	19,344	84,101
Eastern	25,688	26,211	144,821	25,704	25,857	113,180
Pacific	304	318	1,926	304	306	1,384
Southern	20,023	20,552	117,782	20,239	20,395	87,092
Western	15,931	16,477	100,556	16,000	16,166	72,908
Subtotal	**81,188**	**83,397**	**474,600**	**81,595**	**82,245**	**359,487**

Disclaimer: This proposed rule has been submitted to the Office of the Federal Register (OFR) for publication, and is currently pending placement on public inspection at the OFR and publication in the Federal Register. This draft version of the proposed rule may vary slightly from the published document if minor technical or formatting changes are made during the OFR review process. Only the version published in the Federal Register is the official proposed rule.

Table VIII.B.13. Profile of Small and Very Small Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Small (SBA/RFA)			Very Small (<20)		
	Entities	Establishments	Employees	Entities	Establishments	Employees
Manufacturing						
Alaskan	161	180	1,703	141	147	430
Central	28,332	29,454	617,095	20,447	20,529	95,353
Eastern	33,582	34,481	611,009	25,312	25,388	112,950
Pacific	282	288	2,422	248	248	818
Southern	24,499	25,279	450,901	18,822	18,884	83,417
Western	24,347	24,818	337,592	19,945	19,989	76,876
Subtotal	**111,203**	**114,500**	**2,020,722**	**84,915**	**85,185**	**369,844**
Oil and Gas						
Alaskan	53	61	692	29	29	70
Central	2,861	3,003	15,645	2,423	2,443	4,948
Eastern	1,391	1,458	9,518	1,116	1,125	2,497
Pacific	0	0	0	0	0	0
Southern	10,562	11,375	87,027	8,658	8,691	17,744
Western	1,561	1,631	9,034	1,306	1,308	2,807
Subtotal	**16,428**	**17,527**	**121,915**	**13,532**	**13,596**	**28,065**
Postal and Delivery Services						
Alaskan	21	33	34	18	18	26
Central	1,374	1,951	11,199	1,168	1,171	1,544
Eastern	2,238	3,001	18,998	1,899	1,900	2,351
Pacific	25	36	56	20	20	27
Southern	1,965	2,731	17,147	1,709	1,720	2,104
Western	1,533	2,081	17,285	1,302	1,309	1,733
Subtotal	**7,155**	**9,832**	**64,719**	**6,115**	**6,139**	**7,785**
Recreation and Amusement						
Alaskan	258	262	836	243	244	407
Central	9,660	9,978	76,652	8,093	8,131	23,284
Eastern	14,184	14,593	126,221	11,535	11,573	34,163
Pacific	176	182	1,996	131	131	387

Table VIII.B.13. Profile of Small and Very Small Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Small (SBA/RFA)			Very Small (<20)		
	Entities	Establishments	Employees	Entities	Establishments	Employees
Southern	9,058	9,335	79,313	7,510	7,547	22,207
Western	7,620	7,976	68,703	6,226	6,251	18,228
Subtotal	**40,956**	**42,326**	**353,720**	**33,738**	**33,877**	**98,674**
Sanitation and Waste Removal						
Alaskan	17	17	260	16	16	144
Central	598	613	11,803	519	519	5,716
Eastern	908	925	21,423	763	765	8,892
Pacific	13	16	510	10	10	186
Southern	579	600	13,810	481	482	5,650
Western	403	416	10,566	333	334	4,111
Subtotal	**2,517**	**2,586**	**58,372**	**2,120**	**2,125**	**24,699**
Telecommunications						
Alaskan	0	0	0	4	4	18
Central	6	6	28	281	303	1,237
Eastern	11	12	108	370	388	1,356
Pacific	0	0	0	2	3	13
Southern	14	16	124	341	361	1,341
Western	14	14	71	271	286	1,089
Subtotal	**46**	**48**	**332**	**1,269**	**1,344**	**5,054**
Temporary Help Services						
Alaskan	3	3	111	2	2	24
Central	746	785	58,271	487	490	4,506
Eastern	1,258	1,305	92,651	845	847	7,409
Pacific	9	10	1,444	5	5	43
Southern	1,001	1,064	81,872	663	666	5,193
Western	734	765	47,601	520	525	3,995
Subtotal	**3,752**	**3,933**	**281,950**	**2,522**	**2,537**	**21,170**
Transportation						
Alaskan	472	551	2,648	402	407	779

Table VIII.B.13. Profile of Small and Very Small Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Small (SBA/RFA)			Very Small (<20)		
	Entities	Establishments	Employees	Entities	Establishments	Employees
Central	35,362	35,967	100,567	32,172	32,196	40,920
Eastern	30,938	31,687	109,558	27,247	27,290	38,381
Pacific	336	378	3,401	248	252	513
Southern	30,063	31,185	121,185	26,656	26,726	38,318
Western	22,303	23,056	77,739	19,941	20,008	26,654
Subtotal	**119,474**	**122,823**	**415,098**	**106,667**	**106,879**	**145,566**
Utilities						
Alaskan	56	86	742	34	37	110
Central	1,169	2,078	18,326	711	760	2,076
Eastern	1,235	2,285	22,667	835	957	2,177
Pacific	12	25	105	9	9	28
Southern	2,393	3,494	28,343	1,911	1,960	4,049
Western	1,279	1,717	11,810	1,067	1,103	3,123
Subtotal	**6,144**	**9,686**	**81,995**	**4,568**	**4,826**	**11,564**
Warehousing						
Alaskan	21	22	126	10	10	17
Central	2,193	3,078	70,279	732	753	1,639
Eastern	2,820	3,920	105,756	1,034	1,051	2,412
Pacific	42	51	449	8	8	34
Southern	2,570	3,800	87,420	965	975	2,066
Western	2,035	2,888	67,352	806	820	1,817
Subtotal	**9,681**	**13,759**	**331,382**	**3,555**	**3,618**	**7,985**
Non-Core						
Alaskan	1,503	1,582	14,497	1,594	1,620	5,729
Central	109,785	114,774	1,251,037	117,012	117,910	428,271
Eastern	175,885	181,593	1,867,095	189,755	190,941	648,153
Pacific	2,738	2,857	22,687	2,818	2,851	9,578
Southern	133,234	138,262	1,099,714	147,342	148,376	508,465
Western	113,249	117,242	1,000,087	122,703	123,582	423,075

Table VIII.B.13. Profile of Small and Very Small Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Small (SBA/RFA)			Very Small (<20)		
	Entities	Establishments	Employees	Entities	Establishments	Employees
Subtotal	**536,394**	**556,310**	**5,255,118**	**581,225**	**585,280**	**2,023,270**
Total						
Alaskan	6,241	6,582	37,172	5,982	6,031	16,526
Central	444,478	460,042	3,722,756	407,614	409,405	1,300,411
Eastern	627,742	645,388	5,138,694	590,884	593,119	1,898,531
Pacific	9,027	9,397	74,988	8,161	8,205	29,227
Southern	486,148	504,089	3,870,261	450,999	452,925	1,477,979
Western	411,599	425,189	3,342,781	384,105	385,778	1,268,393
Total	**1,985,235**	**2,050,685**	**16,186,651**	**1,847,745**	**1,855,463**	**5,991,068**

Source: OSHA, based on BLS, 2023; Census Bureau, 2021a; Census Bureau, 2023a; Census Bureau, 2023b; Census Bureau, 2023d; Firehouse Magazine, 2022a; Firehouse Magazine 2022b; SBA 2023; USDA, 2019; USFA, 2023.
Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

C. Costs of Compliance.

I. Introduction.

This section presents OSHA's preliminary analysis of the compliance costs associated with the proposed standard for Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings.

OSHA estimates that the proposed standard would cost annually $7.8 billion (in 2023 dollars) at a discount rate of 2 percent. On average, the annualized cost per establishment is estimated to be $3,085.[48] All costs were annualized using a discount rate of 2 percent, consistent with OMB Circular A-4 (OMB, 2023).[49] A 10-year period is used to annualize one-time costs or other costs that do not occur every year. Note that the benefits of the proposed standard, discussed in Section VIII.E. of this PEA, are also annualized over a 10-year period. Therefore, the time horizon of OSHA's complete analysis of this proposed standard is 10 years. Employment and production in affected sectors are implicitly held constant over this time horizon for purposes of the analysis.

While some employers may be able to make fixed investments to reduce their marginal per-employee costs (e.g., on-site freezers, air conditioning) as a result of the proposed standard, for the purposes of this cost analysis OSHA assumes that employers do not make these adjustments. This assumption may result in an overestimate of the costs of compliance (e.g., for some firms it may be less costly to install air conditioning

[48] Spreadsheet detailing all calculations discussed in this analysis are available in Analytical Support for OSHA's Preliminary Economic Analysis for the Heat Injury and Illness Prevention (OSHA, 2024c).
[49] Section VIII.C.V., Total Costs, presents total annualized costs, discounted (2 percent over a 10-year period) and undiscounted.

rather than increasing rest break time for employees). The agency also did not explore all potential societal costs (i.e., those that do not affect the proposed standard's economic feasibility). OSHA welcomes comment on other impacts the rule may have on employees that the agency has not considered in this preliminary analysis but should consider in the final analysis.

The remainder of this section is organized as follows: first, OSHA discusses cost assumptions used in the analysis, followed by the derivation of the wage rates used to estimate labor costs. Next, OSHA presents unit and total costs by affected industry sector and region and by applicable provision of the proposed standard. The final section presents the total costs of the proposed standard for all affected entities and employees as well as those that meet the SBA/RFA definitions of small entities and those with fewer than 20 employees. Discussion of burden reducing regulatory alternatives and regulatory options that may increase costs of compliance are discussed in Section VIII.F.II.G., Alternatives and Regulatory Options to the Proposed Rule.

II. Cost Assumptions.

This section describes the cost assumptions used in this analysis including those relevant to baseline conditions, temperature, and heat-related incidence rates. OSHA welcomes comment on all assumptions and estimates discussed in this section. Additional data or suggestions on methodological changes the agency should consider are also welcome.

A. Baseline Non-Compliance Rates.

The estimated costs of the proposed standard are measured against the baseline activities of the affected industries, including core and non-core industries (see Section VIII.B., Profile of Affected Industries for a discussion and definition of core industries). The baseline for this analysis includes existing conformity ("compliance") with the provisions of the proposed standard. Compliance costs are estimated only for "non-compliant" entities with practices that currently do not conform to the proposed standard and who would therefore incur costs to comply with it.

OSHA developed baseline non-compliance rates (percent of non-compliant entities) based on a review of existing state requirements (e.g., state heat standards, non-heat-specific paid rest break state laws[50]), state-level workforce characteristics (e.g., prevalence of piece-rate pay, collective bargaining), and other industry practices when employees are exposed to heat-related hazards in the workplace, datasets and reports detailing current practices within specific industries, feedback from participants in the Small Business Advocacy Review (SBAR) Panel, and professional expertise of OSHA staff. OSHA prioritized the use of state-specific data sources wherever possible; however, in the absence of state-specific data, national data sources were used to develop baseline non-compliance rates. In some instances, no data were available to develop baseline non-compliance rates for certain provisions within certain industries. In these cases, OSHA assumed default non-compliance rates for those industries, in some cases distinguishing between core and non-core industries (see Section VIII.B.II.A. for more information on

[50] In most cases, federal law does not require the provision of rest breaks, see *https://www.dol.gov/general/topic/workhours/breaks*.

core industries). For certain provisions (i.e., heat hazard evaluation and acclimatization), OSHA believes that non-compliance rates among core industries may be lower than those within non-core industries (i.e., employers in core industries are doing more of what OSHA would require under this proposed standard) because core industries have more affected employees, and more heat-related hazards present in their work processes. For this reason, core industries may be more likely to have policies and procedures in place to protect employees from heat-related hazards on their work sites than employers in non-core industries who may be less aware of heat hazards present in their workplace. However, for other provisions (e.g., providing drinking water and rest break policies) current employment practices are affected by factors beyond heat; therefore, OSHA assumes default non-compliance rates for all industries, assuming they are the same for core and non-core industries.

Some states already have heat standards that address some or all settings in the state. While the agency estimates that all covered employers would incur some costs to comply with this proposed standard, employers in states that have heat standards will likely have lower compliance costs since they are already doing some of what would be required by OSHA. This is reflected in this analysis. Table VIII.C.1. shows the states with existing state heat standards and the corresponding industries and work settings within the scope of those state standards.

Table VIII.C.1. States and Industries with Existing State Heat Standards

Sector	State	Source
Outdoor Settings – NAICS 11, 23, 2111, 213111, 213112, 561730 [a]	California	Cal. Code of Regs. tit. 8, § 3395 (2005)
Indoor and Outdoor Settings – NAICS11	Colorado	7 Colo. Code Regs. § 1103-15 (2022)

Table VIII.C.1. States and Industries with Existing State Heat Standards

Sector	State	Source
Indoor Settings – All Sectors	Minnesota	Minn. R. 5205.0110 (1997)
Indoor and Outdoor Settings – All sectors	Oregon	Or. Admin. R. 437-002-0156 (2022); Or. Admin. R. 437-004-1131 (2022)
Outdoor Settings – All Sectors	Washington	Wash. Admin. Code § 296-62-095 through 296-62-09560; § 296-307-097 through § 296-307-09760 (2023)

[a] California's standard only covers outdoor workers within select industries within sector 11. Covered agricultural sectors include 1111, 1112, 1113, 1114, 1119, 1121, 1122, 1123, 1124, 1125, 1129, 1151, and 1152.

Since all affected establishments would need to incur some cost to develop a HIIPP that meets OSHA's requirements, OSHA assumes that even establishments with existing HIIPPs in place would incur costs to review and modify their HIIPP to meet OSHA's requirements. Table VIII.C.2. shows the percentages of establishments estimated to have existing HIIPPs in place in certain industries and states.

Table VIII.C.2. Percentage of Establishments with Existing Heat Injury and Illness Prevention Plans

Sector	State	Percent of Establishments	Source
NAICS 11, 23, 2111, 213111, 213112, 4841, 4842, 4884, 4889, 561730 [a]	California	100.0% [b]	Cal. Code of Regs. tit. 8, § 3395 (2005)
Sector 11	Colorado	100.0%	7 Colo. Code Regs. § 1103-15 (2022)
All Sectors	Minnesota	100.0%	Minn. R. 5205.0110 (1997)
All Sectors	Oregon	100.0%	Or. Admin. R. 437-002-0156 (2022); Or. Admin. R. 437-004-1131 (2022)
All Sectors	Washington	100.0%	Wash. Admin. Code § 296-62-095 through 296-62-09560; § 296-307-097 through § 296-307-09760 (2023)
Sectors 23 and 31-33	National	75.0%	OSHA Estimate
Core Industries	National	50.0%	OSHA Estimate
Non-Core Industries	National	10.0%	OSHA Estimate

[a] California's standard only covers select industries within sector 11. Covered agricultural sectors include 1111, 1112, 1113, 1114, 1119, 1121, 1122, 1123, 1124, 1125, 1129, 1151, and 1152.
[b] California's standard specifies that 6-digit NAICS industries 213111, 213112, and 561730 need to follow the requirements of that rule. Since OSHA analyzes costs and economic impacts for this proposed

Table VIII.C.2. Percentage of Establishments with Existing Heat Injury and Illness Prevention Plans

Sector	State	Percent of Establishments	Source

standard at the 4-digit NAICS level, OSHA assumes that only a subset of NAICS 2131 and 5617 in California are already compliant with the requirements of OSHA's proposed standard. For NAICS 2131, OSHA assumes that 40 percent of NAICS 2131 are already compliant (since 213111 and 213112 represent two of the five 6-digit NAICS within the 4-digit NAICS 2131). For NAICS 5617, OSHA assumes that 20 percent of NAICS 5617 are already compliant (since 561730 represents one of the five 6-digit NAICS within the 4-digit NAICS 5617).

Table VIII.C.3. shows the estimated baseline non-compliance rates for rest breaks at both the initial and high heat triggers by state. OSHA estimated state-level non-compliance rates for rest breaks at the initial and high heat triggers based on a review of existing state requirements (state heat standards, non-heat-specific paid rest break state laws), state-level workforce characteristics (prevalence of piece-rate pay, collective bargaining), and existing paid rest breaks in collective bargaining agreements (Justia, 2022; DOL, 2023a; DOL, 2023b; NCFH, 2022; Gittleman and Pierce, 2013; Adams et al. 2009; Hirsch et al., n.d.; DOL, 2024b).

For each state, the state-level non-compliance rate for initial heat trigger rest breaks is assumed to be equal to the percentage of non-union piece-rate workers in that state.[51] Based on review of existing collective bargaining agreements, feedback from Small Entity Representatives during the SBAR Panel process reporting high current compliance with if-needed rest breaks (which is also consistent with worker surveys such as Mirabelli et al. (2010) and Langer et al. (2021) reporting high current compliance with if-needed rest breaks), and evidence that piece-rate workers are incentivized to work

[51] Detailed formulas are available in Noncompliance Rates for Rest Breaks (OSHA, 2024e).

faster and take fewer rest breaks than non-piece-rate workers as reported in focus group discussions with U.S. farmworkers (Wadsworth et al., 2019; Lam et al., 2013), OSHA assumes that, nationwide, all non-piece-rate workers and workers affiliated with a union (both piece-rate and non-piece-rate) are already allowed rest breaks if needed from their employer.

State-level non-compliance rates for high heat trigger rest breaks were calculated based on the state or territory's current paid rest break laws, state heat standards, prevalence of rest breaks in collective bargaining agreements, and the share of employees affiliated with a union (by membership or representation).[52] The rationale behind the formulas is as follows. Non-union piece-rate employees in any state are likely the least protected, currently assumed to be taking zero breaks at the high heat trigger.[53] Non-union non-piece-rate employees are likely most protected in states with a heat standard (i.e., these employees are getting most required scheduled rest breaks in addition to if-needed rest breaks), less protected in states with some non-heat-related paid break law (these workers are getting some scheduled rest breaks), and the least protected in states with no paid break law (these employees may be getting no scheduled rest breaks). Also,

[52] Detailed formulas are available in Noncompliance Rates for Rest Breaks (OSHA, 2024e). In estimating unit costs of compliance with the high heat trigger breaks, OSHA estimates that employers that are fully noncompliant in outdoor and indoor settings will incur 47 minutes and 41 minutes per employee, respectively. However, in the state-level baseline compliance calculations OSHA assumes that employers (indoor and outdoor) that offer 47 minutes of break plus travel time are 100 percent compliant with the high heat trigger breaks. This simplifying assumption results in an underestimate of baseline compliance for indoor employers—employers with indoor workers that are technically currently 100 percent compliant by already providing 41 minutes of break time (including travel time) are calculated as being 87 percent compliant (41 minutes provided/47 minutes), instead of 100 percent (fully compliant).

[53] This assumption may overestimate non-compliance of employers of piece-rate workers in states that have laws requiring paid rest breaks for piece-rate workers (in all sectors for California, in the agricultural sector for Washington State).

in any state, OSHA assumes that employees (both piece-rate and non-piece-rate) affiliated with a union are more protected than non-union employees by being provided some scheduled as well as if-needed rest breaks. Collective bargaining agreements differ across employers and states; however, collective bargaining agreements are likely more protective (meaning employees covered by a union are likely to get more scheduled rest breaks) in states with a heat standard or non-heat-related paid break law than in states with no paid break law.

OSHA acknowledges that there is limited information on current baseline non-compliance rates for rest breaks in (1) states without existing rest breaks laws and (2) states with existing rest break laws. OSHA welcomes feedback on the assumptions and estimates of rest break non-compliance by state (and territory) described above. OSHA is soliciting feedback on whether the assumptions regarding compliance differences by workforce characteristics (e.g., piece rate workers, union work, state break laws, state heat laws) are reasonable or if there are alternative methods, sources of data, or assumptions that should be considered. OSHA is especially interested in existing research or data sources that can be used to evaluate the impact of rest breaks in states with existing requirements.

Table VIII.C.3. Rest Break Non-Compliance Rates by State and Territory

State	Initial Heat Trigger	High Heat Trigger
Alabama	6.3%	67.7%
Alaska	6.0%	65.7% [a]
American Samoa [b]	6.2%	67.1%
Arkansas	6.4%	68.3%
Arizona	6.6%	70.0%
California	5.7%	13.7%
Colorado	6.3%	15.3%
Connecticut	6.0%	65.9%

Table VIII.C.3. Rest Break Non-Compliance Rates by State and Territory

State	Initial Heat Trigger	High Heat Trigger
District of Columbia	6.3%	67.9%
Delaware	6.3%	67.9%
Florida	6.6%	69.7%
Georgia	6.6%	69.5%
Guam [b]	6.2%	67.1%
Hawaii	4.8%	58.4%
Idaho	6.6%	69.5%
Illinois	5.8%	28.4%
Indiana	6.1%	66.3%
Iowa	6.3%	67.6%
Kansas	6.0%	66.2%
Kentucky	6.0%	29.0%
Louisiana	6.6%	69.6%
Maine	6.4%	68.2%
Maryland	6.2%	29.8%
Massachusetts	5.9%	65.6%
Michigan	5.6%	63.2%
Minnesota	5.9%	28.6%
Mississippi	6.0%	66.2%
Missouri	5.9%	65.5%
Montana	6.0%	66.0%
Nebraska	6.4%	68.4%
Nevada	5.6%	27.4%
New Hampshire	6.4%	68.4%
New Jersey	5.5%	62.9%
New Mexico	6.4%	68.7%
New York	5.2%	61.1%
North Carolina	6.7%	70.4%
North Dakota	6.4%	68.3%
Northern Mariana Islands [b]	6.2%	67.1%
Ohio	6.0%	65.6%
Oklahoma	6.6%	69.6%
Oregon	5.9%	5.9%
Pennsylvania	5.8%	64.9%
Puerto Rico [b]	6.2%	67.1%
Rhode Island	5.9%	65.0%
South Carolina	6.7%	70.6%
South Dakota	6.7%	70.5%
Tennessee	6.4%	68.6%
Texas	6.6%	69.7%
Utah	6.5%	68.8%
U.S. Virgin Islands [b]	6.2%	67.1%

Table VIII.C.3. Rest Break Non-Compliance Rates by State and Territory

State	Initial Heat Trigger	High Heat Trigger
Vermont	5.8%	64.9%
Virginia	6.6%	69.9%
Washington	5.5%	13.3%
West Virginia	6.0%	66.0%
Wisconsin	6.2%	67.1%
Wyoming	6.6%	69.5%

[a] The weather data (discussed in Section VIII.B.) do not show Alaska meeting or exceeding the high heat trigger. However, OSHA applied the same assumptions used for other states to arrive at a non-compliance rate for Alaska that would be applied if there were exposure to heat at or above the high heat trigger. In the current analysis, the cost for high heat trigger rest breaks is zero for employers in Alaska. In the event that the estimation methodology for exposure to heat used in the final analysis is changed in a manner that results in employees in Alaska being found to be exposed to heat at or above the high heat trigger, this non-compliance rate will be applied in those situations.

[b] Rest break non-compliance rates for U.S. territories were imputed using the employment-weighted average of the non-compliance rates of the states without any paid break law.

Source: OSHA estimates based on Justia, 2022; DOL, 2023a; DOL, 2023b; NCFH, 2022; Gittleman and Pierce, 2013; Adams et al. 2009; Hirsch et al., n.d.; DOL, 2024b; formulas in OSHA, 2024e.

Table VIII.C.4. shows the estimated baseline non-compliance rates for all other requirements of the proposed standard. Within certain provisions, OSHA outlines different non-compliance rates for certain requirements under each provision (e.g., OSHA found that some state rules require initial training on heat-related hazards for employees but do not require refresher training).

OSHA welcomes feedback on the baseline non-compliance estimates that are detailed in Table VIII.C.4. OSHA seeks information and feedback on the following topics: alternative sources; existing employer practices in states with or without existing heat regulations; variation in non-compliance based on employer size, industry, and occupation; and the assumption that non-core industries tend to have lower baseline compliance (and higher non-compliance) than core industries.

Disclaimer: This proposed rule has been submitted to the Office of the Federal Register (OFR) for publication, and is currently pending placement on public inspection at the OFR and publication in the Federal Register. This draft version of the proposed rule may vary slightly from the published document if minor technical or formatting changes are made during the OFR review process. Only the version published in the Federal Register is the official proposed rule.

Table VIII.C.4. Non-Compliance Rates by Provision

Industry/Sector	State	Non-Compliance Estimate	Source
Heat Injury and Illness Prevention Plan			
Develop or Modify HIIPP			
All Sectors [a]	National	100.0%	OSHA estimate
Review HIIPP			
All Sectors	National	50.0%	OSHA estimate
Employee Involvement			
All Sectors	National	75.0%	OSHA estimate
Identifying Heat Hazards			
Environmental Monitoring - Outdoor			
NAICS 11, 23, 2111, 213111, 213112, 4841, 4842, 4884, 4889, 561730 [b]	California	0.0% [c]	Cal. Code of Regs. tit. 8, § 3395 (2005)
Sector 11	Colorado	0.0%	7 Colo. Code Regs. § 1103-15 (2022)
All Sectors	Minnesota	0.0%	Minn. R. 5205.0110 (1997)
All Sectors	Oregon	0.0%	Or. Admin. R. 437-002-0156 (2022); Or. Admin. R. 437-004-1131 (2022)
All Sectors	Washington	0.0%	Wash. Admin. Code § 296-62-095 through 296-62-09560; § 296-307-097 through § 296-307-09760 (2023)
Sectors 23 and 31-33	National	16.7%	OSHA, 2023
All Other Industries	National	20.0%	OSHA Estimate
Environmental Monitoring - Indoor			
NAICS 11, 23, 2111, 213111, 213112, 4841, 4842, 4884, 4889, 561730 [b]	California	0.0% [c]	Cal. Code of Regs. tit. 8, § 3395 (2005)
Sector 11	Colorado	0.0%	7 Colo. Code Regs. § 1103-15 (2022)
All Sectors	Minnesota	0.0%	Minn. R. 5205.0110 (1997)
All Sectors	Oregon	0.0%	Or. Admin. R. 437-002-0156 (2022); Or. Admin. R. 437-004-1131 (2022)
All Sectors	Washington	0.0%	Wash. Admin. Code § 296-62-095 through 296-62-09560; § 296-307-097 through § 296-307-09760 (2023)
Sectors 23 and 31-33	National	16.7%	OSHA, 2023
All Other Core Industries	National	50.0%	OSHA Estimate
All Other Non-Core Industries	National	90.0%	OSHA Estimate
Hazard Evaluation			
NAICS 2211	National	28.3%	Kaltsatou et al., 2021
Sectors 23 and 31-33	National	7.7%	OSHA, 2023
All Other Core Industries	National	50.0%	OSHA Estimate
All Other Non-Core Industries	National	90.0%	OSHA Estimate
Employee Involvement			
All sectors	National	75.0%	OSHA Estimate
Requirements at or Above the Initial Heat Trigger			

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Table VIII.C.4. Non-Compliance Rates by Provision

Industry/Sector	State	Non-Compliance Estimate	Source
Drinking Water			
NAICS 11, 23, 2111, 213111, 213112, 4841, 4842, 4884, 4889, 561730 [b]	California	0.0% [c]	Cal. Code of Regs. tit. 8, § 3395 (2005)
Sector 23	Texas	59.0%	Workers Defense Project, 2013
Sector 11 [d]	National	3.0%	DOL, 2022
All Other Industries	National	10.0%	OSHA Estimate
Break Area(s) at Outdoor Work Sites			
NAICS 11, 23, 2111, 213111, 213112, 4841, 4842, 4884, 4889, 561730 [b]	California	0.0% [c]	Cal. Code of Regs. tit. 8, § 3395 (2005)
Sectors 23 and 31-33	National	20.0%	OSHA, 2023
All Other Core Industries	National	50.0%	OSHA Estimate
All Other Non-Core Industries	National	90.0%	OSHA Estimate
Indoor Work Area and Break Area Controls			
All Sectors	Oregon	0.0%	Or. Admin. R. 437-002-0156 (2022); Or. Admin. R. 437-004-1131 (2022)
Sectors 23 and 31-33	National	50.0%	OSHA, 2023
All Other Core Industries	National	50.0%	OSHA Estimate
All Other Non-Core Industries	National	90.0%	OSHA Estimate
Acclimatization - New Employees			
NAICS 11, 23, 2111, 213111, 213112, 4841, 4842, 4884, 4889, 561730 [b]	California	0% [c]	Cal. Code of Regs. tit. 8, § 3395 (2005)
Sectors 23 and 31-33	National	44.8%	OSHA, 2023
NAICS 2111	National	72.0%	Ergodyne, 2020
All Other Core Industries	National	50.0%	OSHA Estimate
All Other Non-Core Industries	National	90.0%	OSHA Estimate
Acclimatization - Returning Employees			
Sector 11	Colorado	0.0%	7 Colo. Code Regs. § 1103-15 (2022)
All Sectors	Oregon	0.0%	Or. Admin. R. 437-002-0156 (2022); Or. Admin. R. 437-004-1131 (2022)
Sectors 23 and 31-33	National	67.2%	OSHA, 2023
All Other Core Industries	National	50.0%	OSHA Estimate
All Other Non-Core Industries	National	90.0%	OSHA Estimate
Effective Communication —- Supervisor [e]			
All sectors	National	25.0%	OSHA Estimate
Effective Communication —- Employee [e]			
All sectors	National	50.0%	OSHA Estimate
Requirements at or Above the High Heat Trigger			
Observation for Signs and Symptoms - Supervisor			
All Sectors	National	25.0%	OSHA Estimate
Observation for Signs and Symptoms - Employee			

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Table VIII.C.4. Non-Compliance Rates by Provision

Industry/Sector	State	Non-Compliance Estimate	Source
All Sectors	National	50.0%	OSHA Estimate
Hazard Alert			
NAICS 11, 23, 2111, 213111, 213112, 4841, 4842, 4884, 4889, 561730 [b]	California	0.0% [c]	Cal. Code of Regs. tit. 8, § 3395 (2005)
Sector 11	Colorado	0.0%	7 Colo. Code Regs. § 1103-15 (2022)
Sectors 23 and 31-33	National	9.1%	OSHA, 2023
All Other Core Industries	National	50.0%	OSHA Estimate
All Other Non-Core Industries	National	90.0%	OSHA Estimate
Heat Illness and Emergency Response and Planning			
NAICS 11, 23, 2111, 213111, 213112, 4841, 4842, 4884, 4889, 561730 [b]	California	0.0% [c]	Cal. Code of Regs. tit. 8, § 3395 (2005)
Sector 11	Colorado	50.0%	7 Colo. Code Regs. § 1103-15 (2022)
Sectors 23 and 31-33	National	16.7%	OSHA, 2023
All Other Core Industries	National	50.0%	OSHA Estimate
All Other Non-Core Industries	National	90.0%	OSHA Estimate
Training			
Initial Training			
NAICS 11, 23, 2111, 213111, 213112, 4841, 4842, 4884, 4889, 561730 [b]	California	0.0% [c]	Cal. Code of Regs. tit. 8, § 3395 (2005)
Sector 11	Colorado	0.0%	7 Colo. Code Regs. § 1103-15 (2022)
All Sectors	Minnesota	0.0%	Minn. R. 5205.0110 (1997)
All Sectors	Oregon	0.0%	Or. Admin. R. 437-002-0156 (2022); Or. Admin. R. 437-004-1131 (2022)
All Sectors	Washington	0.0%	Wash. Admin. Code § 296-62-095 through 296-62-09560; § 296-307-097 through § 296-307-09760 (2023)
Sectors 23 and 31-33	National	20.0%	OSHA, 2023
NAICS 2211	National	26.1%	Kaltsatou et al., 2021
All Other Core Industries	National	50.0%	OSHA Estimate
All Other Non-Core Industries	National	90.0%	OSHA Estimate
Refresher Training			
Sector 11	Colorado	0.0%	7 Colo. Code Regs. § 1103-15 (2022)
All Sectors	Minnesota	0.0%	Minn. R. 5205.0110 (1997)
All Sectors	Oregon	0.0%	Or. Admin. R. 437-002-0156 (2022); Or. Admin. R. 437-004-1131 (2022)
All Sectors	Washington	0.0%	Wash. Admin. Code § 296-62-095 through 296-62-09560; § 296-307-097 through § 296-307-09760 (2023)
Sectors 23 and 31-33	National	0.0%	OSHA, 2023
All Other Core Industries	National	50.0%	OSHA Estimate
All Other Non-Core Industries	National	90.0%	OSHA Estimate

Table VIII.C.4. Non-Compliance Rates by Provision

Industry/Sector	State	Non-Compliance Estimate	Source
Recordkeeping			
Sectors 23 and 31-33	National	64.3%	OSHA, 2023
All Other Core Industries	National	50.0%	OSHA Estimate
All Other Non-Core Industries	National	90.0%	OSHA Estimate

[a] OSHA assumes that all employers will need to develop a HIIPP, either by creating a new HIIPP or reviewing and updating an existing HIIPP to comply with the proposed standard. More discussion of the calculation of HIIPP total costs can be found in Section VIII.C.V.B.
[b] The California state rule only covers select industries within sector 11. Covered agricultural sectors include NAICS 1111, 1112, 1113, 1114, 1119, 1121, 1122, 1123, 1124, 1125, 1129, 1151, and 1152.
[c] California's standard specifies that 6-digit NAICS 213111, 213112, and 561730 need to follow the requirements of that rule. Since OSHA analyzes costs and economic impacts for this proposed standard at the 4-digit NAICS level, OSHA assumes that only a subset of NAICS 2131 and 5617 in California are already compliant with the requirements of OSHA's proposed standard. For NAICS 2131, OSHA assumes that 40 percent of NAICS 2131 are already compliant (since NAICS 213111 and 213112 represent two of the five 6-digit NAICS within the 4-digit NAICS 2131). For NAICS 5617, OSHA assumes that 20 percent of NAICS 5617 are already compliant (since NAICS 561730 represents one of the five 6-digit NAICS industries within the 4-digit NAICS 5617). Using these assumptions, 60 percent of NAICS 2131 and 80 percent of NAICS 5617 are considered non-compliant.
[d] Only covers NAICS industry groups 1111, 1112, 1113, 1114, 1119, 1121, 1122, 1123, 1151, and 1152 within sector 11.
[e] Compliance with the effective communication provision of the proposed standard requires employers to maintain two-way communication with employees and to regularly communicate with employees. For the purposes of this cost analysis, OSHA assumes that 50 percent of employers are currently compliant with the provision. OSHA also assumes that half of the remaining non-compliant employers currently engage in one-way communication (from supervisor to employee) and would only incur costs for the employee's time communicating with or responding to the supervisor, which is reflected in the different non-compliance estimates (for employer and supervisor) for effective communication.

B. Cost Savings.

OSHA also considers potential cost savings from the proposed standard as a result of requiring employers to provide employees if-needed or scheduled rest breaks (see Appendix A at the end of this section for additional details on the assumptions and estimates discussed in this section). The best available evidence indicates that when employees are exposed to heat and are not allowed to take rest breaks or adjust their work hours, they must pace themselves (i.e., work more slowly) to counteract the effects of heat exposure. OSHA has preliminarily determined that when employees are offered rest breaks, cost savings will accrue to employers who are currently noncompliant with the rest break requirements because their employees will work more efficiently (i.e., pace themselves less) during work time not spent on rest breaks. For the purposes of this analysis, OSHA assumes that when calculating the unit cost of rest break requirements, these accrued cost savings partially offset the wage cost of the employee's time spent in required rest breaks.

OSHA has estimated how many minutes of work time are lost due to employees pacing themselves when the heat index is equal to the initial and high heat triggers.[54]

[54] The extent of labor productivity loss due to pacing is evaluated when the heat index is equal to the initial or high heat triggers. However, the annual number of work hours used in the calculation of total labor cost savings from the required rest breaks capture work hours when the heat index is at or above the triggers (see discussion of temperature data in the following Section VIII.C.II.C.). That is, in the calculation of the total labor cost savings, for example, a worker exposed to 95°F heat index is assumed to lose the same amount of labor productivity as a worker exposed to 90°F heat index (the high heat trigger). This discrepancy and other simplifying assumptions would result in potential misestimate of labor productivity losses from pacing and therefore potential misestimate of total labor cost savings, as discussed in more detail in Appendix A.

OSHA bases these estimates on empirical studies and assumed that the employees in these studies represent a nationwide average employee (for any state, industry, type of worksite, etc.). Some studies included employees who took no rest breaks. Some studies included employees who took only if-needed rest breaks but not scheduled rest breaks, and others included employees who took both if-needed and scheduled rest breaks. OSHA found that there was a decrease in pacing among employees who took if-needed rest breaks and a greater decrease in pacing among those who took scheduled rest breaks as well as if-needed rest breaks, as compared with employees who took no rest breaks. Reductions in pacing at the initial heat trigger from adding if-needed rest breaks and reductions in pacing at the high heat trigger from adding scheduled rest breaks are translated into equivalent minutes of work time saved as a share of the full unit time-cost of these rest breaks, which are then monetized to derive total labor costs saved for employers.

C. Temperature.

Some of the requirements of the proposed standard would only be required when the heat index meets or exceeds a certain heat trigger (i.e., the initial heat trigger at 80°F or the high heat trigger at 90°F). Requirements dependent on the heat index meeting or exceeding certain triggers include, among other things:

- Rest breaks (at both the initial and high heat triggers),
- Acclimatization (at the initial heat trigger),
- Effective communication (initial heat trigger),
- Observation for signs and symptoms (high heat trigger), and

- Hazard Alert (high heat trigger).

In order to calculate the number of times these costs would be incurred by entities on a state-by-state basis, OSHA used heat index data from the NOAA Local Climatological Data (LCD) for 2020 through 2022 (NOAA, 2023b). The LCD data included heat index measurements on an hourly basis for NWS stations across the country. Due to limited data availability, OSHA reviewed a subset of 245 weather stations, ultimately analyzing 238 stations for the calculation. For each station, OSHA determined the number of workday[55] hours that met or exceeded each of the heat triggers within each shift type as outlined in Section VIII.B., Profile of Affected Industries. From here, OSHA took the average of the number of workday hours meeting or exceeding each of the heat triggers across stations in each state.[56] OSHA excluded seven of the 245 stations for which 10 percent or more of all heat index measurements across all three years of data analyzed were missing.[57] OSHA also evaluated the temperature data to identify states with relatively low levels of humidity[58] (Arizona, Nevada, New Mexico, and Utah) to inform costs related to dehumidification. OSHA used outdoor weather data as a proxy for high heat conditions in indoor settings without adequate climate control. Logically, where a building does not have air conditioning, there is a correlation between the temperature

[55] Workday hours in the LCD data are defined as hours on weekdays Monday through Friday for each shift type.

[56] OSHA acknowledges that this may be imprecise in states where the climate varies widely between different parts of the state. However, the agency lacks data that would allow for employers and employees to be more precisely located within a given state. OSHA welcomes comment on this issue and suggestions for methodologies to more precisely represent employee exposure within states.

[57] Based on this methodology, seven stations were excluded: McGrath, AK; St. Paul Island, AK; North Little Rock, AR; Eureka, CA; Marquette, MI; Minneapolis, MN; and Mt. Washington, NH.

[58] OSHA acknowledges that due to intrastate variation in climatic conditions, this method may underestimate the number of geographic areas that have relatively low humidity.

indoors and the temperature outdoors. This may overstate or understate the effects of outdoor temperature on indoor temperatures. A well-insulated building without air conditioning may be cooler than the outside environment, but a poorly insulated, poorly ventilated building that absorbs considerable direct sunlight may be hotter. Even though exposure to process heat may be exacerbated by outdoor temperatures (e.g., on a hot day existing climate control may be inadequate in a hot kitchen), there may be instances where exposure to process heat occurs on relatively cool days. The agency lacks data to make a finer estimate than using outdoor weather as a proxy for indoor heat conditions but welcomes data and suggestions for improved estimation methodology. The results of this analysis are presented in Table VIII.C.5.

Table VIII.C.5. Average Annual Hours Exceeding Heat Triggers by State and Work Shift

State	Daytime Shift		Evening Shift		Overnight Shift	
	Initial Heat Trigger	High Heat Trigger	Initial Heat Trigger	High Heat Trigger	Initial Heat Trigger	High Heat Trigger
Alaska	2	0	2	0	0	0
Alabama	766	372	347	93	101	15
American Samoa [a]	1,481	231	576	11	168	0
Arkansas	674	376	498	218	145	15
Arizona	701	321	536	233	239	55
California	452	158	256	75	41	0
Colorado	401	61	155	15	8	0
Connecticut	312	87	152	22	22	0
District of Columbia [b]	535	236	278	75	68	2
Delaware	457	182	245	55	54	3
Florida	1,259	669	781	273	440	103
Georgia	740	339	393	115	49	1
Guam [a]	1,481	231	576	11	168	0
Hawaii	1,481	231	576	11	168	0
Iowa	389	119	214	51	24	1
Idaho	347	86	237	49	15	0
Illinois	446	123	205	44	36	2
Indiana	413	113	214	43	28	2
Kansas	565	242	334	108	57	1

Table VIII.C.5. Average Annual Hours Exceeding Heat Triggers by State and Work Shift

State	Daytime Shift		Evening Shift		Overnight Shift	
	Initial Heat Trigger	High Heat Trigger	Initial Heat Trigger	High Heat Trigger	Initial Heat Trigger	High Heat Trigger
Kentucky	474	158	272	67	42	4
Louisiana	925	516	585	220	310	61
Massachusetts	225	61	96	15	22	1
Maryland	539	243	286	77	68	0
Maine	150	30	42	4	6	0
Michigan	243	35	120	13	6	0
Minnesota	186	29	78	10	5	0
Missouri	546	214	325	98	75	7
Mississippi	789	420	389	132	107	15
Montana	250	39	141	17	2	0
North Carolina	566	222	297	72	51	4
North Dakota	270	55	163	29	7	0
Nebraska	482	169	286	79	30	1
New Hampshire	248	68	93	13	8	0
New Jersey	451	176	243	60	66	5
New Mexico	579	125	304	41	33	0
Nevada	557	189	328	99	130	14
New York	256	48	106	9	17	1
Northern Mariana Islands [a]	1,481	231	576	11	168	0
Ohio	357	73	179	26	12	0
Oklahoma	643	334	456	182	132	10
Oregon	245	56	141	28	4	0
Pennsylvania	342	87	184	31	23	1
Puerto Rico	1,942	1,115	1,604	502	1,104	126
Rhode Island	304	108	118	23	23	1
South Carolina	687	301	361	92	73	3
South Dakota	377	96	203	44	18	0
Tennessee	571	214	334	88	63	7
Texas	908	498	676	277	279	38
Utah	489	136	368	71	55	0
U.S. Virgin Islands [c]	1,942	1,115	1,604	502	1,104	126
Virginia	532	230	270	74	67	4
Vermont	229	46	115	12	15	0
Washington	170	36	94	16	5	0
Wisconsin	310	68	145	26	22	1
West Virginia	318	58	143	23	4	0
Wyoming	323	28	110	5	3	0

Source: NOAA, 2023b.

Table VIII.C.5. Average Annual Hours Exceeding Heat Triggers by State and Work Shift

State	Daytime Shift		Evening Shift		Overnight Shift	
	Initial Heat Trigger	High Heat Trigger	Initial Heat Trigger	High Heat Trigger	Initial Heat Trigger	High Heat Trigger

[a] The NOAA data OSHA used did not have data available for American Samoa, Guam, and the Northern Mariana Islands. Estimates for these island areas are set equal to Hawaii's estimates.

[b] The NOAA data OSHA used did not have data available for the District of Columbia. These estimates reflect the midpoint between Maryland and Virginia's estimates presented in this table.

[c] The NOAA data OSHA used did not have data available for the U.S. Virgin Islands. Estimates for the USVI are set equal to Puerto Rico's estimates given their relative proximity.

D. Heat-Related Illnesses – Counts and Incidence Rates.

The provisions of the proposed standard addressing Heat Illness and Emergency Response and Planning would require establishments to develop and implement a plan to treat employees experiencing heat-related illnesses, including heat emergencies. The proposed standard requires additional actions for employers when the heat-related illness is considered a heat emergency; therefore, it is important to estimate separately the incidents of heat-related illnesses that are heat emergencies and those that are not heat emergencies. Using the methods detailed in Section VIII.E., OSHA estimated the average expected annual number of heat-related illnesses by industry sector after the implementation of the proposed standard, including adjustments for effectiveness and undercount as described below. Using the estimates of heat-related fatal and non-fatal illnesses by industry sector from the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI) (BLS, 2024c) and Survey of Occupational Injuries and Illnesses (SOII) from 2011–2022 (BLS, 2023b), OSHA assumed an undercount by a factor of 7.5 for non-fatal heat-related illnesses and 3 for fatal heat-related illnesses. As also discussed in Section V.C., Risk Reduction and Section VIII.E., Benefits, OSHA also assumed an effectiveness rate of 95 percent in reducing heat-related fatal illnesses and 65 percent for non-fatal illnesses. Finally, since costs are dependent on the severity of illness, OSHA assumed that 5.3 percent[59] of heat-related illnesses are emergencies, and all others are considered non-emergencies for this analysis. Then, the number of estimated incidents for each sector was divided by the number of establishments deemed in-scope of the proposed standard to calculate the estimated per-establishment incident rate for each sector. OSHA welcomes feedback on the data, assumptions, and methods used to estimate the number of heat-related illnesses (emergencies and non-emergencies) by sector, as well as the per-establishment incidence rates by sector.

Table VIII.C.6. shows the total estimated number of heat-related illness emergencies and non-emergencies anticipated annually with the proposed standard in place for each sector, as well as per-establishment incidence rates for each sector.[60]

OSHA welcomes feedback on the assumptions, methods of estimation, and data used to estimate per-establishment incidence rates (emergencies and non-emergencies) for each sector. OSHA acknowledges the possibility that there may be variability in underreporting by industry sector, occupation, or some other measure and welcomes additional data or information on that possibility.

[59] OSHA estimated the percentage of heat-related illnesses that would be considered emergencies using Harduar Morano and Watkins (2017). Using their results reported in Table 2 in that paper, OSHA calculated the percentage of all HRIs reviewed (emergency room visits, hospitalizations, and deaths) that were coded as heat stroke (5.3 percent).

[60] This assumes that rates in the future will be the same as rates in the recent past. This may be inaccurate if rates are reduced due to the efficacy of this proposed standard or if rates increase if more workers are exposed to hot environments.

Table VIII.C.6. Summary of Heat-Related Illnesses – Non-Emergencies and Emergencies by Sector

Sector	Non-Emergencies		Emergencies	
	Annual Incidents	Incidence Rate	Annual Incidents	Incidence Rate
11	249	0.002	16	0.000
21	120	0.006	8	0.000
22	68	0.004	4	0.000
23	1,270	0.002	80	0.000
31-33	1,056	0.007	62	0.000
42	325	0.008	19	0.000
44-45	456	0.003	26	0.000
48-49	808	0.004	46	0.000
51	236	0.011	14	0.001
52	27	0.000	2	0.000
53	141	0.003	8	0.000
54	102	0.001	6	0.000
55	51	0.007	3	0.000
56	729	0.013	44	0.001
61	23	0.001	1	0.000
62	207	0.005	12	0.000
71	112	0.001	7	0.000
72	255	0.001	15	0.000
81	259	0.001	15	0.000
92	1,643	0.317	94	0.018

Source: OSHA estimate derived from BLS, 2023b, and BLS, 2024c.

III. Labor Rates.

Labor costs associated with the proposed standard are derived using wage data from BLS' cross-industry Occupational Employment and Wage Statistics (OEWS) for May 2022 (BLS, 2023c). For the purposes of this cost analysis, two employee types are used to represent affected employees: "designated person" and "at-risk worker." For each industry sector, OSHA estimated the average hourly wage for these two employee types.

For the purpose of estimating costs, wages for the designated person position were derived by filtering the OEWS data for occupations that included "Manager," "Supervisor," or "Director" in their Standard Occupational Classification (SOC) title and then reviewing those occupations to identify those that may be expected to directly supervise employees exposed to heat-related hazards.[61] Occupations used in the analysis include those (1) that have detailed occupation codes (i.e., six-digit SOC code), (2) deemed to supervise potentially at-risk employees, (3) with recorded employment numbers, and (4) with recorded median hourly wage data. For these occupations, OSHA calculated the percentage of each industry sector's total available employment that each detailed occupation represented. OSHA then calculated the weighted average hourly wage for each sector using the product of these percentages and the corresponding median hourly wage estimates from the OEWS. OSHA assumes that the average hourly wages calculated for each represent those for designated workers. OSHA acknowledges that this method of estimation may lead to an overestimate in wage costs as the designated person does not necessarily have to be a supervisor, manager, or director in all cases. For this analysis, OSHA also uses these wages developed for designated persons to represent supervisors' wages. OSHA welcomes feedback on the assumptions, methods, and data used to estimate the wages of a designated person.

Wages for at-risk workers are calculated using a process similar to the process used to calculate the number of affected employees in Section VIII.B.IV.A. The main differences for determining the wages for at-risk workers are that the methodology for estimating wages uses OEWS data at the 2-digit NAICS sector level instead of the 4-digit

[61] Although for purposes of this cost analysis OSHA distinguishes between a “designated person” and “at-risk workers,” this terminology is not intended to suggest that supervisors or managers who supervise workers exposed to heat related hazards are not themselves also “at risk” when exposed to the same hazards.

NAICS industry group level and that some occupations that are otherwise used to determine the percentage of employees that are exposed to heat-related hazards are not included for the wage calculation because the relevant employment and/or wage data are undisclosed. OSHA calculated the percentage of a given sector's at-risk employment made up by each SOC code and multiplied this percentage by the hourly median wage from OEWS. Finally, OSHA summed these products for each sector to estimate the weighted average hourly wage for at-risk workers in each sector.

OSHA uses the estimated hourly wage rates to calculate a loaded wage rate that includes three types of cost: hourly base wage, fringe benefits, and overhead costs.

For the calculation of fringe benefit costs, OSHA used data from BLS' Employer Costs for Employee Compensation (ECEC) for December 2023 (BLS, 2024b) to determine that fringe benefits can be estimated as 45 percent of base wages or 31.1 percent of total compensation.

OSHA also accounts for indirect expenses that cannot be tied to producing a specific product or service, called overhead costs. Common examples include rent, utilities, and office equipment. There is no consensus on the cost elements that fit this definition and the lack of a common definition has led to a wide range of overhead estimates. Consequently, the treatment of overhead costs needs to be case-specific. In this analysis, OSHA used an overhead rate of 17 percent of base wages (EPA, 2002; Rice, 2002). This 17 percent rate is based on an estimate of overhead costs for safety and health professionals in large private organizations. This overhead rate is consistent with, for example, the overhead rate used in the Final Economic Analysis (FEA) in support of

OSHA's 2023 final rule amending its occupational injury and illness recordkeeping (88 FR 47254) and the economic feasibility analysis in support of OSHA's 2021 Healthcare Emergency Temporary Standard (Healthcare ETS).[62] (86 FR 32376). OSHA expects that this rate is likely an overestimate in this context, as this reflects a component of *average* overhead; in this case, however, the agency anticipates that, for example, designated persons and at-risk workers will be able to work within the general physical infrastructure in which they currently operate. A rate of 17 percent of base wages is equivalent to 11.71 percent of the hourly wage rate with fringe applied.[63]

To calculate the fully loaded hourly labor cost, OSHA added the three components together: base wages + fringe benefits (31.1 percent of total compensation) + applicable overhead (17 percent of base wages). Table VIII.C.7. shows the loaded hourly wages used in the analysis. OSHA welcomes feedback on the assumptions, methods, and data used to estimate the wages of a designated person and at-risk worker.

Table VIII.C.7. Wage Rates Used in the Analysis (2023$)

Sector	Median Hourly Wage [a]	Fringe [b]	Fringe-Adjusted Overhead [c]	Loaded Hourly Wage [d]
Designated Person				

[62] See the FEAs in in the Improved Tracking of Workplace Injuries and Illnesses FEA (*https://www.govinfo.gov/content/pkg/FR-2023-07-21/pdf/2023-15091.pdf*) and the feasibility analysis support of OSHA's 2021 Healthcare ETS (86 FR 32376) (*https://www.govinfo.gov/content/pkg/FR-2021-06-21/pdf/2021-12428.pdf*).The methodology was modeled after an approach used by the EPA. More information on this approach can be found at: U.S. Environmental Protection Agency, "Wage Rates for Economic Analyses of the Toxics Release Inventory Program," June 10, 2002 (Ex. 2066). This analysis itself was based on a survey of several large chemical manufacturing plants: Heiden Associates, *Final Report: A Study of Industry Compliance Costs Under the Final Comprehensive Assessment Information Rule*, Prepared for the Chemical Manufacturers Association, December 14, 1989, Ex. 2065.

[63] The fringe-adjusted overhead rate, 11.71%, is calculated as 68.9 percent * 17 percent, i.e., the percent of wages that are the base hourly rate exclusive of fringe (68.9 percent) multiplied by the overhead rate as a percentage of base hourly wages (17 percent).

Disclaimer: This proposed rule has been submitted to the Office of the Federal Register (OFR) for publication, and is currently pending placement on public inspection at the OFR and publication in the Federal Register. This draft version of the proposed rule may vary slightly from the published document if minor technical or formatting changes are made during the OFR review process. Only the version published in the Federal Register is the official proposed rule.

Table VIII.C.7. Wage Rates Used in the Analysis (2023$)

Sector	Median Hourly Wage [a]	Fringe [b]	Fringe-Adjusted Overhead [c]	Loaded Hourly Wage [d]
11	$30.73	45.0%	11.7%	$49.83
21	$50.76	45.0%	11.7%	$82.31
22	$57.93	45.0%	11.7%	$93.94
23	$42.26	45.0%	11.7%	$68.53
31-33	$43.15	45.0%	11.7%	$69.97
42	$42.41	45.0%	11.7%	$68.77
44-45	$26.45	45.0%	11.7%	$42.89
48-49	$37.37	45.0%	11.7%	$60.59
51	$54.75	45.0%	11.7%	$88.78
52	$49.94	45.0%	11.7%	$80.98
53	$36.94	45.0%	11.7%	$59.91
54	$59.00	45.0%	11.7%	$95.67
55	$60.81	45.0%	11.7%	$98.62
56	$34.51	45.0%	11.7%	$55.97
61	$36.68	45.0%	11.7%	$59.49
62	$34.49	45.0%	11.7%	$55.92
71	$28.83	45.0%	11.7%	$46.75
72	$20.50	45.0%	11.7%	$33.24
81	$33.58	45.0%	11.7%	$54.45
92	$45.08	45.0%	11.7%	$73.10
At-Risk Worker				
11	$16.53	45.0%	11.7%	$26.80
21	$28.65	45.0%	11.7%	$46.46
22	$46.58	45.0%	11.7%	$75.53
23	$27.10	45.0%	11.7%	$43.95
31-33	$22.62	45.0%	11.7%	$36.68
42	$26.11	45.0%	11.7%	$42.34
44-45	$16.21	45.0%	11.7%	$26.28
48-49	$20.52	45.0%	11.7%	$33.27
51	$35.48	45.0%	11.7%	$57.54
52	$35.92	45.0%	11.7%	$58.24
53	$23.09	45.0%	11.7%	$37.44
54	$47.08	45.0%	11.7%	$76.34
55	$54.28	45.0%	11.7%	$88.02
56	$17.00	45.0%	11.7%	$27.56
61	$20.15	45.0%	11.7%	$32.68
62	$17.56	45.0%	11.7%	$28.48
71	$15.55	45.0%	11.7%	$25.21
72	$14.88	45.0%	11.7%	$24.13
81	$21.17	45.0%	11.7%	$34.33

Table VIII.C.7. Wage Rates Used in the Analysis (2023$)

Sector	Median Hourly Wage [a]	Fringe [b]	Fringe-Adjusted Overhead [c]	Loaded Hourly Wage [d]
92	$31.28	45.0%	11.7%	$50.72

Source: OSHA estimate derived from BLS, 2023c; BLS, 2024b; O*NET, 2023; EPA, 2002; and Rice, 2002.
[a] Median hourly wage rates are drawn from BLS' sector-level OEWS for May 2022. For the designated person, the wages represent a weighted average of wage across SOC codes that would directly supervise potentially at-risk workers. For the at-risk worker, the wages reflect weighted averages between SOC codes that are deemed in-scope for this proposed standard.
[b] The fringe rate is drawn from BLS' ECEC for December 2023 (BLS, 2024b).
[c] The overhead rate is derived from EPA (2002) and Rice (2002).
[d] The loaded hourly wage = median hourly wage *(1+fringe rate)*(1+fringe-adjusted overhead rate)

IV. Estimated Unit Costs of Compliance.

This section presents the estimated unit costs of the proposed standard by industry sector and proposed provision. Unless otherwise noted in this section, the time estimates for complying with proposed provisions are based on OSHA's professional expertise, considering what the proposed standard requires and estimates of the hours necessary to comply with similar requirements in other OSHA rules. OSHA welcomes comment on all estimates discussed here. Additional data or suggestions on methodological changes the agency should consider are also welcome.

A. Rule Familiarization.

All employers affected by the proposed standard would need to review the requirements under the proposed standard. While some employers will read the standard, many will likely rely on compliance assistance documents prepared by OSHA or by trade or industry associations that will provide the needed information in a simpler manner that would take less time to review and digest than the regulatory language. OSHA estimates that rule familiarization would take a designated person one hour to complete. Table VIII.C.8. shows the unit costs for rule familiarization by industry sector.

B. Heat Injury and Illness Prevention Plan (HIIPP).

Table VIII.C.8. Unit Costs – Rule Familiarization (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
11	1.0	$49.83	Designated Person	Establishment	One-Time
21	1.0	$82.31	Designated Person	Establishment	One-Time
22	1.0	$93.94	Designated Person	Establishment	One-Time
23	1.0	$68.53	Designated Person	Establishment	One-Time
31-33	1.0	$69.97	Designated Person	Establishment	One-Time
42	1.0	$68.77	Designated Person	Establishment	One-Time
44-45	1.0	$42.89	Designated Person	Establishment	One-Time
48-49	1.0	$60.59	Designated Person	Establishment	One-Time
51	1.0	$88.78	Designated Person	Establishment	One-Time
52	1.0	$80.98	Designated Person	Establishment	One-Time
53	1.0	$59.91	Designated Person	Establishment	One-Time
54	1.0	$95.67	Designated Person	Establishment	One-Time
55	1.0	$98.62	Designated Person	Establishment	One-Time
56	1.0	$55.97	Designated Person	Establishment	One-Time
61	1.0	$59.49	Designated Person	Establishment	One-Time
62	1.0	$55.92	Designated Person	Establishment	One-Time
71	1.0	$46.75	Designated Person	Establishment	One-Time
72	1.0	$33.24	Designated Person	Establishment	One-Time
81	1.0	$54.45	Designated Person	Establishment	One-Time
92	1.0	$73.10	Designated Person	Establishment	One-Time

Source: OSHA estimate derived from BLS, 2023c; BLS, 2024b; O*NET, 2023; EPA, 2002; and Rice, 2002.

Under paragraph (c) of the proposed standard, employers must create a written HIIPP,[64] with the input from employees. OSHA acknowledges that some employers may already have an existing HIIPP that may only need to be modified to comply with the proposed standard. The HIIPP must include:

- A comprehensive list of the types of work activities covered by the plan;

[64] Employers with 10 or fewer employees do not have to write out their HIIPP.

- All policies and procedures necessary to comply with the requirements of this proposed standard including those to protect employees while wearing vapor-impermeable clothing; and
- Identification of the heat metric (i.e., heat index or wet bulb globe temperature) the employer will monitor to identify heat hazards.

Further, the employer must designate one or more heat safety coordinators to implement and monitor the HIIPP, make the HIIPP readily available to all employees in a language that all employees understand, and review the HIIPP whenever a heat-related incident occurs those results in death, days away from work, medical treatment beyond first aid, or loss of consciousness. The review of the HIIPP must occur at least annually.

For employers with an existing HIIPP in place, OSHA assumes that employers will designate someone to review their HIIPP and make any modifications necessary to comply with the proposed standard. OSHA estimates this process will require 2.5 hours of the designated person's time. Employers that do not have an existing HIIPP could either choose to use a HIIPP template (for example, one provided by OSHA as part of rollout materials or one from a trade organization) or write a HIIPP from scratch. Because writing a HIIPP from scratch without the help of a template would be considerably more onerous, OSHA expects that most employers would not choose this option and would, instead, opt to use a template which the agency estimates would require approximately six hours of a designated person's time to locate, review, identify relevant sections, and fill in worksite-specific information on hazards, controls, and procedures. For employers that are exempt from writing their HIIPP (i.e., those with ten or less employees) OSHA assumes that they will spend four hours using a template to guide their creation of a HIIPP. OSHA assumes that five percent of employers will have complex or unique situations where a template would not be usable. For these employees, OSHA estimates that it will take 30 hours of a designated person's time to prepare the HIIPP. OSHA welcomes comments and input on these estimates and assumptions. The agency would like information and data on how these estimates correspond to the costs incurred by employers who have developed written HIIPPs, whether the time estimates are reasonable, and what method employers have taken when developing their plans.

Additionally, the proposed standard would require employers to review and update the HIIPP periodically. Regardless of how employers develop or modify their HIIPPs initially, OSHA estimates that the process of reviewing and updating the HIIPP would take the person designated on average one hour per year to do so.

The proposed standard would also require that employers involve non-managerial employees in the creation or initial modification of the HIIPP, as well as in the process of periodically reviewing and updating the HIIPP. OSHA assumes that a representative group of employees (four employees per establishment) will take one hour each during the initial development of the HIIPP to provide feedback, regardless of whether the employer has an existing HIIPP. This same representative group of employees would take 20 minutes each during the review and update of the HIIPP to provide feedback. OSHA welcomes comments and input on these estimates and assumptions. The agency would like information and data on how these estimates correspond to the costs incurred by employers who have developed written HIIPPs, whether the time estimates are reasonable, and what method employers have taken when developing their plans.

Table VIII.C.9. shows the units costs for developing and updating the HIIPP by industry sector.

Table VIII.C.9. Unit Costs – Heat Injury and Illness Prevention Plan (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
Write HIIPP from Scratch					
11	30.0	$1,494.92	Designated Person	Establishment	One-Time
21	30.0	$2,469.40	Designated Person	Establishment	One-Time
22	30.0	$2,818.32	Designated Person	Establishment	One-Time
23	30.0	$2,055.78	Designated Person	Establishment	One-Time
31-33	30.0	$2,099.13	Designated Person	Establishment	One-Time
42	30.0	$2,063.18	Designated Person	Establishment	One-Time
44-45	30.0	$1,286.74	Designated Person	Establishment	One-Time
48-49	30.0	$1,817.75	Designated Person	Establishment	One-Time
51	30.0	$2,663.34	Designated Person	Establishment	One-Time
52	30.0	$2,429.29	Designated Person	Establishment	One-Time
53	30.0	$1,797.15	Designated Person	Establishment	One-Time
54	30.0	$2,869.97	Designated Person	Establishment	One-Time
55	30.0	$2,958.49	Designated Person	Establishment	One-Time
56	30.0	$1,678.99	Designated Person	Establishment	One-Time
61	30.0	$1,784.56	Designated Person	Establishment	One-Time
62	30.0	$1,677.73	Designated Person	Establishment	One-Time
71	30.0	$1,402.49	Designated Person	Establishment	One-Time
72	30.0	$997.21	Designated Person	Establishment	One-Time
81	30.0	$1,633.62	Designated Person	Establishment	One-Time
92	30.0	$2,193.10	Designated Person	Establishment	One-Time
Review and Modify HIIPP – Existing Plan in Place					
11	2.5	$124.58	Designated Person	Establishment	One-Time
21	2.5	$205.78	Designated Person	Establishment	One-Time
22	2.5	$234.86	Designated Person	Establishment	One-Time
23	2.5	$171.31	Designated Person	Establishment	One-Time
31-33	2.5	$174.93	Designated Person	Establishment	One-Time
42	2.5	$171.93	Designated Person	Establishment	One-Time
44-45	2.5	$107.23	Designated Person	Establishment	One-Time
48-49	2.5	$151.48	Designated Person	Establishment	One-Time
51	2.5	$221.94	Designated Person	Establishment	One-Time
52	2.5	$202.44	Designated Person	Establishment	One-Time
53	2.5	$149.76	Designated Person	Establishment	One-Time
54	2.5	$239.16	Designated Person	Establishment	One-Time

Table VIII.C.9. Unit Costs – Heat Injury and Illness Prevention Plan (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
55	2.5	$246.54	Designated Person	Establishment	One-Time
56	2.5	$139.92	Designated Person	Establishment	One-Time
61	2.5	$148.71	Designated Person	Establishment	One-Time
62	2.5	$139.81	Designated Person	Establishment	One-Time
71	2.5	$116.87	Designated Person	Establishment	One-Time
72	2.5	$83.10	Designated Person	Establishment	One-Time
81	2.5	$136.14	Designated Person	Establishment	One-Time
92	2.5	$182.76	Designated Person	Establishment	One-Time
Use HIIPP Template					
11	6.0	$298.98	Designated Person	Establishment	One-Time
21	6.0	$493.88	Designated Person	Establishment	One-Time
22	6.0	$563.66	Designated Person	Establishment	One-Time
23	6.0	$411.16	Designated Person	Establishment	One-Time
31-33	6.0	$419.83	Designated Person	Establishment	One-Time
42	6.0	$412.64	Designated Person	Establishment	One-Time
44-45	6.0	$257.35	Designated Person	Establishment	One-Time
48-49	6.0	$363.55	Designated Person	Establishment	One-Time
51	6.0	$532.67	Designated Person	Establishment	One-Time
52	6.0	$485.86	Designated Person	Establishment	One-Time
53	6.0	$359.43	Designated Person	Establishment	One-Time
54	6.0	$573.99	Designated Person	Establishment	One-Time
55	6.0	$591.70	Designated Person	Establishment	One-Time
56	6.0	$335.80	Designated Person	Establishment	One-Time
61	6.0	$356.91	Designated Person	Establishment	One-Time
62	6.0	$335.55	Designated Person	Establishment	One-Time
71	6.0	$280.50	Designated Person	Establishment	One-Time
72	6.0	$199.44	Designated Person	Establishment	One-Time
81	6.0	$326.72	Designated Person	Establishment	One-Time
92	6.0	$438.62	Designated Person	Establishment	One-Time
No Written HIIPP					
11	4.0	$199.32	Designated Person	Establishment	One-Time
21	4.0	$329.25	Designated Person	Establishment	One-Time
22	4.0	$375.78	Designated Person	Establishment	One-Time
23	4.0	$274.10	Designated Person	Establishment	One-Time
31-33	4.0	$279.88	Designated Person	Establishment	One-Time
42	4.0	$275.09	Designated Person	Establishment	One-Time
44-45	4.0	$171.57	Designated Person	Establishment	One-Time
48-49	4.0	$242.37	Designated Person	Establishment	One-Time
51	4.0	$355.11	Designated Person	Establishment	One-Time
52	4.0	$323.91	Designated Person	Establishment	One-Time
53	4.0	$239.62	Designated Person	Establishment	One-Time
54	4.0	$382.66	Designated Person	Establishment	One-Time

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Table VIII.C.9. Unit Costs – Heat Injury and Illness Prevention Plan (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
55	4.0	$394.46	Designated Person	Establishment	One-Time
56	4.0	$223.87	Designated Person	Establishment	One-Time
61	4.0	$237.94	Designated Person	Establishment	One-Time
62	4.0	$223.70	Designated Person	Establishment	One-Time
71	4.0	$187.00	Designated Person	Establishment	One-Time
72	4.0	$132.96	Designated Person	Establishment	One-Time
81	4.0	$217.82	Designated Person	Establishment	One-Time
92	4.0	$292.41	Designated Person	Establishment	One-Time
HIIPP Development Involvement – Employee					
11	1.0	$26.80	At-Risk Worker	Establishment	One-Time
21	1.0	$46.46	At-Risk Worker	Establishment	One-Time
22	1.0	$75.53	At-Risk Worker	Establishment	One-Time
23	1.0	$43.95	At-Risk Worker	Establishment	One-Time
31-33	1.0	$36.68	At-Risk Worker	Establishment	One-Time
42	1.0	$42.34	At-Risk Worker	Establishment	One-Time
44-45	1.0	$26.28	At-Risk Worker	Establishment	One-Time
48-49	1.0	$33.27	At-Risk Worker	Establishment	One-Time
51	1.0	$57.54	At-Risk Worker	Establishment	One-Time
52	1.0	$58.24	At-Risk Worker	Establishment	One-Time
53	1.0	$37.44	At-Risk Worker	Establishment	One-Time
54	1.0	$76.34	At-Risk Worker	Establishment	One-Time
55	1.0	$88.02	At-Risk Worker	Establishment	One-Time
56	1.0	$27.56	At-Risk Worker	Establishment	One-Time
61	1.0	$32.68	At-Risk Worker	Establishment	One-Time
62	1.0	$28.48	At-Risk Worker	Establishment	One-Time
71	1.0	$25.21	At-Risk Worker	Establishment	One-Time
72	1.0	$24.13	At-Risk Worker	Establishment	One-Time
81	1.0	$34.33	At-Risk Worker	Establishment	One-Time
92	1.0	$50.72	At-Risk Worker	Establishment	One-Time
Review and Update HIIPP					
11	1.0	$49.83	Designated Person	Establishment	Annual
21	1.0	$82.31	Designated Person	Establishment	Annual
22	1.0	$93.94	Designated Person	Establishment	Annual
23	1.0	$68.53	Designated Person	Establishment	Annual
31-33	1.0	$69.97	Designated Person	Establishment	Annual
42	1.0	$68.77	Designated Person	Establishment	Annual
44-45	1.0	$42.89	Designated Person	Establishment	Annual
48-49	1.0	$60.59	Designated Person	Establishment	Annual
51	1.0	$88.78	Designated Person	Establishment	Annual
52	1.0	$80.98	Designated Person	Establishment	Annual
53	1.0	$59.91	Designated Person	Establishment	Annual
54	1.0	$95.67	Designated Person	Establishment	Annual

Table VIII.C.9. Unit Costs – Heat Injury and Illness Prevention Plan (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
55	1.0	$98.62	Designated Person	Establishment	Annual
56	1.0	$55.97	Designated Person	Establishment	Annual
61	1.0	$59.49	Designated Person	Establishment	Annual
62	1.0	$55.92	Designated Person	Establishment	Annual
71	1.0	$46.75	Designated Person	Establishment	Annual
72	1.0	$33.24	Designated Person	Establishment	Annual
81	1.0	$54.45	Designated Person	Establishment	Annual
92	1.0	$73.10	Designated Person	Establishment	Annual
HIIPP Review and Update Involvement – Employee					
11	0.33	$8.93	At-Risk Worker	Establishment	Annual
21	0.33	$15.49	At-Risk Worker	Establishment	Annual
22	0.33	$25.18	At-Risk Worker	Establishment	Annual
23	0.33	$14.65	At-Risk Worker	Establishment	Annual
31-33	0.33	$12.23	At-Risk Worker	Establishment	Annual
42	0.33	$14.11	At-Risk Worker	Establishment	Annual
44-45	0.33	$8.76	At-Risk Worker	Establishment	Annual
48-49	0.33	$11.09	At-Risk Worker	Establishment	Annual
51	0.33	$19.18	At-Risk Worker	Establishment	Annual
52	0.33	$19.41	At-Risk Worker	Establishment	Annual
53	0.33	$12.48	At-Risk Worker	Establishment	Annual
54	0.33	$25.45	At-Risk Worker	Establishment	Annual
55	0.33	$29.34	At-Risk Worker	Establishment	Annual
56	0.33	$9.19	At-Risk Worker	Establishment	Annual
61	0.33	$10.89	At-Risk Worker	Establishment	Annual
62	0.33	$9.49	At-Risk Worker	Establishment	Annual
71	0.33	$8.40	At-Risk Worker	Establishment	Annual
72	0.33	$8.04	At-Risk Worker	Establishment	Annual
81	0.33	$11.44	At-Risk Worker	Establishment	Annual
92	0.33	$16.91	At-Risk Worker	Establishment	Annual

Source: OSHA estimate derived from BLS, 2023c; BLS, 2024b; O*NET, 2023; EPA, 2002; and Rice, 2002.

C. Identifying Heat Hazards.

The proposed standard would require employers to assess where and when employees are exposed to temperatures at or above the initial and high heat triggers. For outdoor work sites, the proposed standard would require employers to monitor heat conditions using either local heat index forecasts or on-site measurement of heat index or wet bulb globe temperature (WBGT). OSHA assumes that all outdoor employers without current monitoring practices will choose the option to monitor local forecasts since the time necessary to do so would be minimal (and many individuals check local forecasts regularly without regard to this proposed standard). Employers may have a designated person at each work site track local forecasts of ambient temperature and humidity provided by the National Weather Service (NWS) (or others) to determine the daily maximum heat index, which the employer would then use to determine which protocols are triggered, if any. For this analysis, OSHA assumes that employers, on average, will take approximately 15 seconds twice a day to monitor the local forecast via a smart phone app.

Alternatively, employers can set up monitoring devices as close as possible to the work area to conduct on-site monitoring. Employers may choose between measuring the heat index or WBGT using monitoring devices. Employers with indoor work sites do not have the option of monitoring local weather forecasts. The first approach, measuring the heat index, would require the employer to designate someone to take measurements of the heat index, or to measure separately the ambient temperature and humidity to calculate heat index (if needed, using the OSHA-NIOSH Heat Safety Tool App as a calculator or the online calculator available from the NWS). OSHA estimates that on average, it will take the designated person 1 minute each time they measure the heat index or ambient temperature and humidity, including calculating the heat index (e.g., by consulting the OSHA-NIOSH App or NWS's online calculator). OSHA also assumes that measurements will be taken on average twice per work day (260 days per year) and that employers using this approach will use a temperature and humidity logger that is capable of automatically uploading relevant environmental information for recordkeeping purposes. OSHA assumes that the designated person will spend 15 minutes to read the logger's user manual. OSHA also assumes that all indoor employers without current monitoring in place will adopt this option.

The second approach, measuring the WBGT, would require the employer to designate someone to take measurements of wet bulb globe temperature. This approach would require the purchase of one WBGT thermometer for each worksite and some of a designated person's time to read the thermometer manual. OSHA assumes that no employers will adopt this option, however some employers may already be using this method. Those employers can continue to use this method under this proposed standard and are not estimated to incur any costs to do so since they are already in compliance.

Employers with indoor work sites would be required to conduct a hazard evaluation to identify the work areas where there is a reasonable expectation that employees are or may be exposed to heat at or above the initial heat trigger. OSHA estimates that conducting the hazard evaluation would require about 3 hours in total.

Employers would be required to seek the input and involvement of non-managerial employees and their representatives, if any, when evaluating the work site to identify work areas with a reasonable expectation of exposures at or above the initial heat trigger and in developing and updating monitoring plans. The time to develop monitoring plans, as well as the time for employee input, is already captured within the time estimate for HIIPP development and employee involvement in HIIPP development. Otherwise, OSHA estimates that employee input for evaluating work sites would require 15 minutes per employee providing input. For this analysis, OSHA assumes four employees per establishment would provide input.

The proposed standard would allow employers to forgo taking measurements if they assume that a work area meets or exceeds both heat triggers. Employers that elect to do this would not incur monitoring costs. These employers would be required to comply with all control measures required at both the initial and high heat triggers as though they took a measurement that meets or exceeds the high heat trigger. OSHA assumes that no employers will newly adopt this option, because the annual monitoring cost per establishment is relatively low compared to the costs to implement other parts of the rule that would be required for employers choosing this option. Most employers will find it less expensive to monitor temperatures and implement the requirements when a trigger is met or exceeded. OSHA welcomes feedback on this assumption, specifically the types of employers that might forgo monitoring and assume that their workplace is at or above both heat triggers.

Table VIII.C.10. shows the labor-based unit costs for identifying heat hazards by industry sector. Table VIII.C.11. shows the equipment costs that employers would incur to comply with the requirements for identifying heat hazards.

Table VIII.C.10. Labor-Based Unit Costs – Identifying Heat Hazards (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
Outdoor Environmental Monitoring					
11	2.2	$107.97	Designated Person	Establishment	Annual
21	2.2	$178.35	Designated Person	Establishment	Annual
22	2.2	$203.55	Designated Person	Establishment	Annual
23	2.2	$148.47	Designated Person	Establishment	Annual
31-33	2.2	$151.60	Designated Person	Establishment	Annual

Disclaimer: This proposed rule has been submitted to the Office of the Federal Register (OFR) for publication, and is currently pending placement on public inspection at the OFR and publication in the Federal Register. This draft version of the proposed rule may vary slightly from the published document if minor technical or formatting changes are made during the OFR review process. Only the version published in the Federal Register is the official proposed rule.

Table VIII.C.10. Labor-Based Unit Costs – Identifying Heat Hazards (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
42	2.2	$149.01	Designated Person	Establishment	Annual
44-45	2.2	$92.93	Designated Person	Establishment	Annual
48-49	2.2	$131.28	Designated Person	Establishment	Annual
51	2.2	$192.35	Designated Person	Establishment	Annual
52	2.2	$175.45	Designated Person	Establishment	Annual
53	2.2	$129.79	Designated Person	Establishment	Annual
54	2.2	$207.28	Designated Person	Establishment	Annual
55	2.2	$213.67	Designated Person	Establishment	Annual
56	2.2	$121.26	Designated Person	Establishment	Annual
61	2.2	$128.88	Designated Person	Establishment	Annual
62	2.2	$121.17	Designated Person	Establishment	Annual
71	2.2	$101.29	Designated Person	Establishment	Annual
72	2.2	$72.02	Designated Person	Establishment	Annual
81	2.2	$117.98	Designated Person	Establishment	Annual
92	2.2	$158.39	Designated Person	Establishment	Annual
Indoor Environmental Monitoring					
11	8.7	$431.87	Designated Person	Establishment	Annual
21	8.7	$713.38	Designated Person	Establishment	Annual
22	8.7	$814.18	Designated Person	Establishment	Annual
23	8.7	$593.89	Designated Person	Establishment	Annual
31-33	8.7	$606.42	Designated Person	Establishment	Annual
42	8.7	$596.03	Designated Person	Establishment	Annual
44-45	8.7	$371.72	Designated Person	Establishment	Annual
48-49	8.7	$525.13	Designated Person	Establishment	Annual
51	8.7	$769.41	Designated Person	Establishment	Annual
52	8.7	$701.80	Designated Person	Establishment	Annual
53	8.7	$519.18	Designated Person	Establishment	Annual
54	8.7	$829.10	Designated Person	Establishment	Annual
55	8.7	$854.67	Designated Person	Establishment	Annual
56	8.7	$485.04	Designated Person	Establishment	Annual
61	8.7	$515.54	Designated Person	Establishment	Annual
62	8.7	$484.68	Designated Person	Establishment	Annual
71	8.7	$405.16	Designated Person	Establishment	Annual
72	8.7	$288.08	Designated Person	Establishment	Annual
81	8.7	$471.94	Designated Person	Establishment	Annual
92	8.7	$633.56	Designated Person	Establishment	Annual
Indoor Identification of Heat-Exposed Work Areas					
11	3.0	$149.49	Designated Person	Establishment	Every 5 Years
21	3.0	$246.94	Designated Person	Establishment	Every 5 Years
22	3.0	$281.83	Designated Person	Establishment	Every 5 Years
23	3.0	$205.58	Designated Person	Establishment	Every 5 Years
31-33	3.0	$209.91	Designated Person	Establishment	Every 5 Years

Table VIII.C.10. Labor-Based Unit Costs – Identifying Heat Hazards (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
42	3.0	$206.32	Designated Person	Establishment	Every 5 Years
44-45	3.0	$128.67	Designated Person	Establishment	Every 5 Years
48-49	3.0	$181.77	Designated Person	Establishment	Every 5 Years
51	3.0	$266.33	Designated Person	Establishment	Every 5 Years
52	3.0	$242.93	Designated Person	Establishment	Every 5 Years
53	3.0	$179.72	Designated Person	Establishment	Every 5 Years
54	3.0	$287.00	Designated Person	Establishment	Every 5 Years
55	3.0	$295.85	Designated Person	Establishment	Every 5 Years
56	3.0	$167.90	Designated Person	Establishment	Every 5 Years
61	3.0	$178.46	Designated Person	Establishment	Every 5 Years
62	3.0	$167.77	Designated Person	Establishment	Every 5 Years
71	3.0	$140.25	Designated Person	Establishment	Every 5 Years
72	3.0	$99.72	Designated Person	Establishment	Every 5 Years
81	3.0	$163.36	Designated Person	Establishment	Every 5 Years
92	3.0	$219.31	Designated Person	Establishment	Every 5 Years
Work Area Evaluation – Employee					
11	0.25	$6.70	At-Risk Worker	Establishment	Every 5 Years
21	0.25	$11.61	At-Risk Worker	Establishment	Every 5 Years
22	0.25	$18.88	At-Risk Worker	Establishment	Every 5 Years
23	0.25	$10.99	At-Risk Worker	Establishment	Every 5 Years
31-33	0.25	$9.17	At-Risk Worker	Establishment	Every 5 Years
42	0.25	$10.58	At-Risk Worker	Establishment	Every 5 Years
44-45	0.25	$6.57	At-Risk Worker	Establishment	Every 5 Years
48-49	0.25	$8.32	At-Risk Worker	Establishment	Every 5 Years
51	0.25	$14.38	At-Risk Worker	Establishment	Every 5 Years
52	0.25	$14.56	At-Risk Worker	Establishment	Every 5 Years
53	0.25	$9.36	At-Risk Worker	Establishment	Every 5 Years
54	0.25	$19.08	At-Risk Worker	Establishment	Every 5 Years
55	0.25	$22.01	At-Risk Worker	Establishment	Every 5 Years
56	0.25	$6.89	At-Risk Worker	Establishment	Every 5 Years
61	0.25	$8.17	At-Risk Worker	Establishment	Every 5 Years
62	0.25	$7.12	At-Risk Worker	Establishment	Every 5 Years
71	0.25	$6.30	At-Risk Worker	Establishment	Every 5 Years
72	0.25	$6.03	At-Risk Worker	Establishment	Every 5 Years
81	0.25	$8.58	At-Risk Worker	Establishment	Every 5 Years
92	0.25	$12.68	At-Risk Worker	Establishment	Every 5 Years
Review Monitoring Equipment User Manual – Indoor					
11	0.25	$12.46	Designated Person	Establishment	One-Time
21	0.25	$20.58	Designated Person	Establishment	One-Time
22	0.25	$23.49	Designated Person	Establishment	One-Time
23	0.25	$17.13	Designated Person	Establishment	One-Time
31-33	0.25	$17.49	Designated Person	Establishment	One-Time

Table VIII.C.10. Labor-Based Unit Costs – Identifying Heat Hazards (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
42	0.25	$17.19	Designated Person	Establishment	One-Time
44-45	0.25	$10.72	Designated Person	Establishment	One-Time
48-49	0.25	$15.15	Designated Person	Establishment	One-Time
51	0.25	$22.19	Designated Person	Establishment	One-Time
52	0.25	$20.24	Designated Person	Establishment	One-Time
53	0.25	$14.98	Designated Person	Establishment	One-Time
54	0.25	$23.92	Designated Person	Establishment	One-Time
55	0.25	$24.65	Designated Person	Establishment	One-Time
56	0.25	$13.99	Designated Person	Establishment	One-Time
61	0.25	$14.87	Designated Person	Establishment	One-Time
62	0.25	$13.98	Designated Person	Establishment	One-Time
71	0.25	$11.69	Designated Person	Establishment	One-Time
72	0.25	$8.31	Designated Person	Establishment	One-Time
81	0.25	$13.61	Designated Person	Establishment	One-Time
92	0.25	$18.28	Designated Person	Establishment	One-Time

Source: OSHA estimate derived from BLS, 2023c; BLS, 2024b; O*NET, 2023; EPA, 2002; and Rice, 2002.

Table VIII.C.11. Equipment-Based Unit Costs - Identifying Heat Hazards (2023$)

Item	Units	Unit Cost	Total Cost per Unit	Basis	Frequency
Monitoring Equipment – Indoor	1.0	$99.00	$99.00	Establishment	One-Time

Source: Kestrel Instruments, 2024.

D. Requirements at or Above the Initial Heat Trigger.

When employees are exposed to heat at or above the initial heat trigger, the proposed standard includes provisions related to drinking water, break areas, work area controls, acclimatization, rest breaks, and effective communication. The costs associated with the evaluation of fan use in paragraph I(6) are included as part of the planning and hazard evaluation discussed in Section VIII.C.IV.C. OSHA has not included costs related to cooling PPE as included in proposed paragraph I(e)(10). Based on feedback from Small Entity Representatives who spoke on the topic during the SBAR Panel process, OSHA believes that use of cooling PPE is not widespread. Where employers are requiring or permitting the use of cooling PPE, OSHA expects that these employers will train employees to remove the PPE once it loses its cooling properties and will include this requirement in their HIIPPs. The cost for this would be included in the costs associated with proposed paragraphs (c) and (h).

I. Drinking Water.

Employers would be required to provide access to one quart (32 fluid ounces) of suitably cool drinking water per employee per hour for the entire shift. To comply with this requirement at both outdoor and indoor work sites, OSHA assumes employers would purchase 40-quart water coolers (with spigots) sufficient to provide the required amount of water. For this analysis, OSHA estimates that the cost of one 40-quart cooler is incurred for every 40 employees. Employers are assumed to purchase one reusable water bottle per employee. Because existing OSHA standards already require employers to provide drinking water, OSHA assumes that nearly all employers currently provide water to their employees. The costs incurred to comply with this proposed standard are assumed to be a result of employers not providing the quantity of water specified by the proposed standard.

II. Break Area(s) at Outdoor Work Sites.

For outdoor work sites, OSHA would require employers to provide employees working outdoors with a break area. Break areas must be readily accessible to the work area and able to accommodate the number of employees on break. Additionally, break areas must have artificial or natural shade, or be an air-conditioned space (e.g., trailers, vehicles, structures). OSHA assumes that employers without existing break areas will use artificial shade in the form of a 12x12 foot tent that all employees on break can reasonably access.

III. Break Area(s) and Work Area(s) at Indoor Work Sites.

OSHA would require employers with indoor work sites to provide employees at those sites with a break area. These break areas must be readily accessible to the work area and able to accommodate the number of employees on break. This space must be air-conditioned or have increased air movement and, if appropriate, de-humidification. OSHA assumes that employers without existing air-conditioned breakrooms will designate a room or an area large enough to accommodate employees on break and that these areas will contain adequate fans and dehumidifiers. Further, employers would be required to provide measures that reduce employee exposure to heat in the work area. One of the ways employers can comply with this requirement is by providing increased air movement and, if appropriate, de-humidification. Adequate fans and dehumidifiers could be used to comply with this requirement. Overall, OSHA assumes that, in all states and territories in the U.S., the average employer that does not already have air conditioning, fans, or dehumidifiers in place will provide two fans per ten employees and, in states where humid conditions may occur, the average employer would also provide two dehumidifiers per ten employees.

IV. Acclimatization.

The proposed standard would require employers to adopt protections for new and returning employees who may not be acclimatized to working in the heat at or above the initial heat trigger during their first week on the job or their first week back on the job after an employee is away from work for more than 14 days. For new employees, OSHA assumes that employers would implement a plan that incorporates the measures required in paragraph (f) when the initial heat trigger is met or exceeded during the first week of work. For purposes of estimating the cost of compliance with this provision, OSHA calculated the cost of rest breaks and observation for signs and symptoms during an employee's first week. While paragraph (f) also requires a hazard alert, OSHA assumes that the hazard alert can be provided by the designated person while conducting observation or during training (for new employees).

The cost of rest breaks and observation during the first week of work, assuming 8-hour shifts that coincide with heat index measurements that meet or exceed the initial heat trigger but do not meet the high heat trigger, equates to roughly 41.75 minutes per day for every new indoor employee and 47.75 minutes per day for every new outdoor employee during the employee's first week on the job. These estimates are the same for returning employees during their first week after returning to work when the heat index is at or above the initial heat trigger. No additional costs were estimated for new or returning employees when the temperature meets or exceeds the high heat trigger, as employers are already required to follow the high heat procedures.

OSHA did not make an additional adjustment for cost savings (see Appendix A at the end of this section for a description of cost savings methodology) as the conditions of those additional rest breaks are different (i.e., different temperature range-rest break combination) than those at which the estimates of labor productivity loss due to pacing in the heat were calculated. To the extent that pacing is reduced for employees undergoing acclimatization protocols, this could overstate the costs of acclimatization. OSHA welcomes comment on this issue and whether the agency should extend the potential cost savings from reduced pacing to workers during their acclimatization period.

V. Rest Breaks if Needed.

The proposed standard would require that employers allow and encourage their employees to take paid rest breaks if needed once the initial heat trigger is met or exceeded to prevent overheating. OSHA assumes that, per 8-hour shift, at-risk employees will take one 10-minute if-needed rest break.[65] OSHA estimates, on average, an additional two minutes for indoor employees per break and an additional four minutes for outdoor employees per break to account for the time to walk to and from the break area.[66] OSHA welcomes feedback on the assumption that an average employee will take one ten-minute if-needed rest break when the temperature is at or above the initial heat trigger and the assumptions for travel time to and from the break area for indoor and outdoor settings.

[65] If-needed rest breaks by new and returning employees when the temperature meets or exceeds the initial heat trigger and is below the high heat trigger are accounted for in the acclimatization costs (Section VIII.C.IV.D.IV). To avoid double counting, if-needed rest breaks were not costed for these employees during their first week of work (for new hires) or the first week back from leave (for returning workers).

[66] These estimates of time needed to walk to and from the break area are meant to be averages across all workers in all settings. In some large indoor settings like warehouses or large manufacturing facilities, the break area may be further from the work areas than other indoor settings where the break area may be directly adjacent to work areas. In outdoor settings, OSHA expects the employer will use a mobile break area set up that allows the break area to be relocated as close as possible to the location employees are working on a given day. However, OSHA recognizes that it may not always be possible to have a break area immediately adjacent to all outdoor work area(s) and some outdoor work sites may have workers spread over relatively large areas (e.g., some agricultural settings, large-scale infrastructure construction projects), which could result in slightly longer times needed to walk to and from the break area.

OSHA has preliminarily determined that when employees are offered rest breaks, cost savings will accrue to employers currently noncompliant with the rest break requirements, as their employees will work more efficiently during the work time not spent on rest breaks (i.e., pace less). At the initial heat trigger, some of the estimated unit cost for if-needed rest breaks (i.e., 10 minutes plus travel time) will be offset by this reduction in pacing, which OSHA considers as cost savings for employers.

For the purposes of calculating accrued employer cost savings, OSHA defined three groups of employees with varying existing break levels (see the introduction in Appendix A at the end of this section for detailed definitions of each group). Group 1 corresponds to employees at establishments that do not currently provide rest breaks when the initial heat trigger is met or exceeded. Group 2 corresponds to employees at establishments that do provide if-needed rest breaks when the initial heat trigger is met or exceeded, but do not have required rest breaks for when the high heat trigger is met or exceeded. Group 3 captures employees at establishments that have already implemented rest breaks protocols that meet the rest break requirements outlined in this proposed standard.[67]

As mentioned in Section VIII.C.II.B. and detailed further in Appendix A at the end of this section, OSHA estimated the minutes spent pacing for each of the three groups when they are working at or above the initial heat trigger. Table VIII.C.12. below shows the time (minutes) per 8-hour shift that OSHA estimates employees in each group

[67] OSHA estimates that approximately 6.1% of employees are in Group 1, 46.9% are in Group 2, and the remaining 47.0% are in Group 3.

currently spend pacing when the initial heat trigger is met or exceeded. Using these estimates, OSHA assumes that with the implementation of if-needed rest breaks, all employees in Group 1 (i.e., not currently taking any breaks) will behave like Group 2 (i.e., those currently taking if-needed rest breaks at or above the initial heat trigger but not scheduled rest breaks at or above the high heat trigger), reducing their pacing (working more efficiently) by 14.0 – 11.2 = 2.8 minutes per shift at the initial heat trigger.

For outdoor employees, this reduction in pacing translates into accrued cost savings of 20 percent (2.8 minutes of pacing reduced/14 minutes of if-needed rest break time[68]) of the unit time-cost per break. This effectively reduces the unit cost of if-needed rest breaks for outdoor employees from 14 to 11.2 minutes. Similarly, for indoor employees, this reduction in pacing reduces the unit time-cost by 2.8/12 = 23.33 percent, from 12[69] to 9.2 minutes per 8-hour shift.

Table VIII.C.12. Labor Productivity Loss from Pacing Above Initial Heat Trigger Before and After Implementation of Required If Needed Rest Breaks and Labor Cost Savings per 8-Hour Shift per Employee

Group	Group Description	Labor Productivity Loss from Pacing Before Required Initial Heat Trigger Rest Breaks (Minutes)	Labor Productivity Loss from Pacing After Required Initial Heat Trigger Rest Breaks (Minutes)	Estimated Labor Cost Savings (Minutes)
Group 1	Employees at establishments that do not currently provide any rest breaks.	14.0	11.2	2.8
Group 2	Employees at establishments that provide rest breaks that meet the initial heat trigger rest break	11.2	11.2	0.0

[68] 10 minutes of if-needed rest break time and 4 minutes of travel time.
[69] 10 minutes of if-needed rest break time and 2 minutes of travel time.

	requirements, but not the high heat trigger rest break requirements.			
Group 3	Employees at establishments that provide rest breaks that meet the initial and high heat trigger rest break requirements.	0.0	0.0	0.0

Source: OSHA estimate.
Note: OSHA estimates that approximately 6.1 percent of employees are in Group 1, 46.9 percent are in Group 2, and 47.0 percent are in Group 3.

VI. Effective Communication.

Employers would be required to maintain a means of effective two-way communication with employees whenever the initial heat trigger is met or exceeded. OSHA assumes that a designated person would communicate with each employee three times for every 8-hour shift that meets or exceeds the initial heat trigger and would spend 15 seconds on each communication. At-risk workers are assumed to spend the same amount of time in communication with the designated person. It is assumed that all employers and employees have a current method for effective two-way communication (e.g., cell phones, walkie talkies) that may be currently used to communicate information about work-related concerns and that these methods may be used when the initial heat trigger is met or exceeded. OSHA welcomes comments on existing methods of two-way communication between employees and employers.

Table VIII.C.13. shows the unit costs for the requirements at or above the initial heat trigger by industry sector. The rest break unit costs reported in Table VIII.C.13. do not reflect the cost savings offset discussed above. Table VIII.C.14. shows the equipment costs (water coolers, water bottles, pedestal fans, dehumidifiers, and tents for artificial shade) that employers would incur to comply with the requirements when the initial heat trigger is met or exceeded.

Table VIII.C.13. Labor-Based Unit Costs - Requirements at or Above the Initial Heat Trigger (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
New Employee Acclimatization – Designated Person					
11	0.01	$0.62	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
21	0.01	$1.03	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
22	0.01	$1.17	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
23	0.01	$0.86	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
31-33	0.01	$0.87	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
42	0.01	$0.86	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
44-45	0.01	$0.54	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
48-49	0.01	$0.76	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
51	0.01	$1.11	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
52	0.01	$1.01	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
53	0.01	$0.75	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
54	0.01	$1.20	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
55	0.01	$1.23	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
56	0.01	$0.70	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
61	0.01	$0.74	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
62	0.01	$0.70	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
71	0.01	$0.58	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
72	0.01	$0.42	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
81	0.01	$0.68	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
92	0.01	$0.91	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
Returning Employee Acclimatization – Designated Person					
11	0.01	$0.62	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
21	0.01	$1.03	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
22	0.01	$1.17	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
23	0.01	$0.86	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
31-33	0.01	$0.87	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)

Table VIII.C.13. Labor-Based Unit Costs - Requirements at or Above the Initial Heat Trigger (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
42	0.01	$0.86	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
44-45	0.01	$0.54	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
48-49	0.01	$0.76	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
51	0.01	$1.11	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
52	0.01	$1.01	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
53	0.01	$0.75	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
54	0.01	$1.20	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
55	0.01	$1.23	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
56	0.01	$0.70	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
61	0.01	$0.74	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
62	0.01	$0.70	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
71	0.01	$0.58	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
72	0.01	$0.42	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
81	0.01	$0.68	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
92	0.01	$0.91	Designated Person	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
New Indoor Employee Acclimatization					
11	0.7	$18.65	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
21	0.7	$32.33	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
22	0.7	$52.56	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
23	0.7	$30.58	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
31-33	0.7	$25.52	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
42	0.7	$29.46	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
44-45	0.7	$18.29	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
48-49	0.7	$23.15	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
51	0.7	$40.04	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
52	0.7	$40.53	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
53	0.7	$26.05	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
54	0.7	$53.12	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
55	0.7	$61.25	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)

Table VIII.C.13. Labor-Based Unit Costs - Requirements at or Above the Initial Heat Trigger (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
56	0.7	$19.18	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
61	0.7	$22.74	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
62	0.7	$19.82	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
71	0.7	$17.54	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
72	0.7	$16.79	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
81	0.7	$23.88	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
92	0.7	$35.30	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
New Outdoor Employee Acclimatization					
11	0.8	$21.33	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
21	0.8	$36.97	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
22	0.8	$60.11	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
23	0.8	$34.97	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
31-33	0.8	$29.19	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
42	0.8	$33.69	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
44-45	0.8	$20.92	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
48-49	0.8	$26.48	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
51	0.8	$45.79	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
52	0.8	$46.35	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
53	0.8	$29.80	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
54	0.8	$60.75	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
55	0.8	$70.05	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
56	0.8	$21.94	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
61	0.8	$26.01	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
62	0.8	$22.66	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
71	0.8	$20.06	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
72	0.8	$19.20	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
81	0.8	$27.32	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
92	0.8	$40.37	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
Returning Indoor Employee Acclimatization					

Table VIII.C.13. Labor-Based Unit Costs - Requirements at or Above the Initial Heat Trigger (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
11	0.7	$18.65	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
21	0.7	$32.33	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
22	0.7	$52.56	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
23	0.7	$30.58	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
31-33	0.7	$25.52	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
42	0.7	$29.46	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
44-45	0.7	$18.29	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
48-49	0.7	$23.15	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
51	0.7	$40.04	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
52	0.7	$40.53	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
53	0.7	$26.05	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
54	0.7	$53.12	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
55	0.7	$61.25	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
56	0.7	$19.18	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
61	0.7	$22.74	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
62	0.7	$19.82	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
71	0.7	$17.54	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
72	0.7	$16.79	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
81	0.7	$23.88	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
92	0.7	$35.30	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
Returning Outdoor Employee Acclimatization					
11	0.8	$21.33	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
21	0.8	$36.97	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
22	0.8	$60.11	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
23	0.8	$34.97	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
31-33	0.8	$29.19	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
42	0.8	$33.69	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
44-45	0.8	$20.92	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
48-49	0.8	$26.48	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)

Table VIII.C.13. Labor-Based Unit Costs - Requirements at or Above the Initial Heat Trigger (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
51	0.8	$45.79	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
52	0.8	$46.35	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
53	0.8	$29.80	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
54	0.8	$60.75	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
55	0.8	$70.05	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
56	0.8	$21.94	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
61	0.8	$26.01	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
62	0.8	$22.66	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
71	0.8	$20.06	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
72	0.8	$19.20	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
81	0.8	$27.32	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
92	0.8	$40.37	At-Risk Worker	Employee	Daily at Initial Heat Trigger (Up to 5 Days)
Rest Breaks at Initial Heat Trigger – Indoor					
11	0.20	$5.36	At-Risk Worker	Employee	Daily at Initial Heat Trigger
21	0.20	$9.29	At-Risk Worker	Employee	Daily at Initial Heat Trigger
22	0.20	$15.11	At-Risk Worker	Employee	Daily at Initial Heat Trigger
23	0.20	$8.79	At-Risk Worker	Employee	Daily at Initial Heat Trigger
31-33	0.20	$7.34	At-Risk Worker	Employee	Daily at Initial Heat Trigger
42	0.20	$8.47	At-Risk Worker	Employee	Daily at Initial Heat Trigger
44-45	0.20	$5.26	At-Risk Worker	Employee	Daily at Initial Heat Trigger
48-49	0.20	$6.65	At-Risk Worker	Employee	Daily at Initial Heat Trigger
51	0.20	$11.51	At-Risk Worker	Employee	Daily at Initial Heat Trigger
52	0.20	$11.65	At-Risk Worker	Employee	Daily at Initial Heat Trigger
53	0.20	$7.49	At-Risk Worker	Employee	Daily at Initial Heat Trigger
54	0.20	$15.27	At-Risk Worker	Employee	Daily at Initial Heat Trigger
55	0.20	$17.60	At-Risk Worker	Employee	Daily at Initial Heat Trigger
56	0.20	$5.51	At-Risk Worker	Employee	Daily at Initial Heat Trigger
61	0.20	$6.54	At-Risk Worker	Employee	Daily at Initial Heat Trigger
62	0.20	$5.70	At-Risk Worker	Employee	Daily at Initial Heat Trigger

Table VIII.C.13. Labor-Based Unit Costs - Requirements at or Above the Initial Heat Trigger (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
71	0.20	$5.04	At-Risk Worker	Employee	Daily at Initial Heat Trigger
72	0.20	$4.83	At-Risk Worker	Employee	Daily at Initial Heat Trigger
81	0.20	$6.87	At-Risk Worker	Employee	Daily at Initial Heat Trigger
92	0.20	$10.14	At-Risk Worker	Employee	Daily at Initial Heat Trigger
Rest Breaks at Initial Heat Trigger – Outdoor					
11	0.23	$6.25	At-Risk Worker	Employee	Daily at Initial Heat Trigger
21	0.23	$10.84	At-Risk Worker	Employee	Daily at Initial Heat Trigger
22	0.23	$17.62	At-Risk Worker	Employee	Daily at Initial Heat Trigger
23	0.23	$10.25	At-Risk Worker	Employee	Daily at Initial Heat Trigger
31-33	0.23	$8.56	At-Risk Worker	Employee	Daily at Initial Heat Trigger
42	0.23	$9.88	At-Risk Worker	Employee	Daily at Initial Heat Trigger
44-45	0.23	$6.13	At-Risk Worker	Employee	Daily at Initial Heat Trigger
48-49	0.23	$7.76	At-Risk Worker	Employee	Daily at Initial Heat Trigger
51	0.23	$13.43	At-Risk Worker	Employee	Daily at Initial Heat Trigger
52	0.23	$13.59	At-Risk Worker	Employee	Daily at Initial Heat Trigger
53	0.23	$8.74	At-Risk Worker	Employee	Daily at Initial Heat Trigger
54	0.23	$17.81	At-Risk Worker	Employee	Daily at Initial Heat Trigger
55	0.23	$20.54	At-Risk Worker	Employee	Daily at Initial Heat Trigger
56	0.23	$6.43	At-Risk Worker	Employee	Daily at Initial Heat Trigger
61	0.23	$7.63	At-Risk Worker	Employee	Daily at Initial Heat Trigger
62	0.23	$6.65	At-Risk Worker	Employee	Daily at Initial Heat Trigger
71	0.23	$5.88	At-Risk Worker	Employee	Daily at Initial Heat Trigger
72	0.23	$5.63	At-Risk Worker	Employee	Daily at Initial Heat Trigger
81	0.23	$8.01	At-Risk Worker	Employee	Daily at Initial Heat Trigger
92	0.23	$11.84	At-Risk Worker	Employee	Daily at Initial Heat Trigger
Effective Communication – Supervisor					
11	0.01	$0.62	Designated Person	Employee	Daily at Initial Heat Trigger
21	0.01	$1.03	Designated Person	Employee	Daily at Initial Heat Trigger
22	0.01	$1.17	Designated Person	Employee	Daily at Initial Heat Trigger

Table VIII.C.13. Labor-Based Unit Costs - Requirements at or Above the Initial Heat Trigger (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
23	0.01	$0.86	Designated Person	Employee	Daily at Initial Heat Trigger
31-33	0.01	$0.87	Designated Person	Employee	Daily at Initial Heat Trigger
42	0.01	$0.86	Designated Person	Employee	Daily at Initial Heat Trigger
44-45	0.01	$0.54	Designated Person	Employee	Daily at Initial Heat Trigger
48-49	0.01	$0.76	Designated Person	Employee	Daily at Initial Heat Trigger
51	0.01	$1.11	Designated Person	Employee	Daily at Initial Heat Trigger
52	0.01	$1.01	Designated Person	Employee	Daily at Initial Heat Trigger
53	0.01	$0.75	Designated Person	Employee	Daily at Initial Heat Trigger
54	0.01	$1.20	Designated Person	Employee	Daily at Initial Heat Trigger
55	0.01	$1.23	Designated Person	Employee	Daily at Initial Heat Trigger
56	0.01	$0.70	Designated Person	Employee	Daily at Initial Heat Trigger
61	0.01	$0.74	Designated Person	Employee	Daily at Initial Heat Trigger
62	0.01	$0.70	Designated Person	Employee	Daily at Initial Heat Trigger
71	0.01	$0.58	Designated Person	Employee	Daily at Initial Heat Trigger
72	0.01	$0.42	Designated Person	Employee	Daily at Initial Heat Trigger
81	0.01	$0.68	Designated Person	Employee	Daily at Initial Heat Trigger
92	0.01	$0.91	Designated Person	Employee	Daily at Initial Heat Trigger
Effective Communication – Employee					
11	0.01	$0.33	At-Risk Worker	Employee	Daily at Initial Heat Trigger
21	0.01	$0.58	At-Risk Worker	Employee	Daily at Initial Heat Trigger
22	0.01	$0.94	At-Risk Worker	Employee	Daily at Initial Heat Trigger
23	0.01	$0.55	At-Risk Worker	Employee	Daily at Initial Heat Trigger
31-33	0.01	$0.46	At-Risk Worker	Employee	Daily at Initial Heat Trigger
42	0.01	$0.53	At-Risk Worker	Employee	Daily at Initial Heat Trigger
44-45	0.01	$0.33	At-Risk Worker	Employee	Daily at Initial Heat Trigger
48-49	0.01	$0.42	At-Risk Worker	Employee	Daily at Initial Heat Trigger
51	0.01	$0.72	At-Risk Worker	Employee	Daily at Initial Heat Trigger
52	0.01	$0.73	At-Risk Worker	Employee	Daily at Initial Heat Trigger
53	0.01	$0.47	At-Risk Worker	Employee	Daily at Initial Heat Trigger

Table VIII.C.13. Labor-Based Unit Costs - Requirements at or Above the Initial Heat Trigger (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
54	0.01	$0.95	At-Risk Worker	Employee	Daily at Initial Heat Trigger
55	0.01	$1.10	At-Risk Worker	Employee	Daily at Initial Heat Trigger
56	0.01	$0.34	At-Risk Worker	Employee	Daily at Initial Heat Trigger
61	0.01	$0.41	At-Risk Worker	Employee	Daily at Initial Heat Trigger
62	0.01	$0.36	At-Risk Worker	Employee	Daily at Initial Heat Trigger
71	0.01	$0.32	At-Risk Worker	Employee	Daily at Initial Heat Trigger
72	0.01	$0.30	At-Risk Worker	Employee	Daily at Initial Heat Trigger
81	0.01	$0.43	At-Risk Worker	Employee	Daily at Initial Heat Trigger
92	0.01	$0.63	At-Risk Worker	Employee	Daily at Initial Heat Trigger

Source: OSHA estimate derived from BLS, 2023c; BLS, 2024b; O*NET, 2023; EPA, 2002; and Rice, 2002.

Table VIII.C.14. Equipment-Based Unit Costs - Requirements at or Above the Initial Heat Trigger (2023$)

Item	Units	Unit Cost	Total Cost per Unit	Basis	Frequency
Coolers with Spigot	1.0	$79.99	$79.99	Employee	One-Time
Reusable Water Bottle	1.0	$0.59	$0.59	Employee	One-Time
Outdoor Break Area Engineering Control	1.0	$119.99	$119.99	Establishment	One-Time
Air Movement	2.0	$134.99	$269.98	Employee	One-Time
Humidity Control	2.0	$39.19	$78.38	Employee	One-Time

Source: OSHA estimate based on Igloo Products Corp., 2024; DiscountMugs, 2024; Amazon.com, Inc, 2024a; Amazon.com, Inc., 2024b; and WebstaurantStore, 2024.

E. Requirements at or Above the High Heat Trigger.

When the high heat trigger is met or exceeded, this proposed standard includes provisions related to rest breaks, observation of employees for signs and symptoms of heat illness, hazard alerts, and excessively high heat areas.

I. Rest Breaks.

When the high heat trigger is met or exceeded, employers would be required to provide a minimum of 15-minute paid rest breaks at least every two hours. The proposed standard specifies that a meal break may count as a rest break, even if it is not otherwise required by law to be paid. For this analysis, OSHA assumes two paid 15-minute rest breaks and an unpaid meal break per at-risk worker per 8-hour shift where the high heat trigger is met or exceeded. At the high heat trigger, employers must also provide if-needed rest breaks (as part of the requirements of the initial heat trigger). Therefore, OSHA assumes that when the high heat trigger is met or exceeded, in addition to 30 minutes per 8-hour shift of scheduled rest break time, at-risk workers would take a five-minute if-needed rest break. The travel time to walk to and from the break area is also accounted for and OSHA assumes two minutes for indoor employees and four minutes for outdoor employees per rest break.

Similar to the discussion in Section VIII.C.IV.D.V., OSHA estimated the amount of time that employees spend pacing themselves when the high heat trigger is met or exceeded over an 8-hour shift (see Table VIII.C.15.). These estimates reflect three groups of employees based on their respective establishments' estimated compliance with the rest break requirements outlined in this proposed standard. Group 1 corresponds to employees at establishments that do not currently provide rest breaks that meet the requirements when the initial heat trigger is met. Group 2 corresponds to employees at establishments that do provide if-needed rest breaks when the initial heat trigger is met or exceeded, but do not have required rest breaks for when the high heat trigger is met or exceeded. Group 3 captures employees at establishments that have already implemented rest breaks protocols that meet the initial and high heat trigger rest break requirements outlined in this proposed standard.

Based on the estimates for pacing mentioned in Section VIII.C.II.B. and detailed further in Appendix A at the end of this section, OSHA estimated the reduction in pacing at the high heat trigger; the estimates for pacing for each group are shown in Table VIII.C.15. OSHA estimated that with the implementation of scheduled rest breaks as well as if-needed rest breaks at the high heat trigger, employees in Group 1 (i.e., that are currently noncompliant with scheduled rest breaks as well as if-needed rest breaks) will behave like those in Group 3 (i.e., rest break protocols are consistent with the requirements of the standard at both triggers) and therefore their pacing reduces by 40.6 – 8.4 = 32.2 minutes. This reduction in pacing translates into 32.2/47 = 68.51 percent of the unit time-cost for rest breaks of 47 minutes and 32.2/41 = 78.53 percent out of the unit time-cost for rest breaks of 41 minutes saved for outdoor and indoor employees, respectively.

Based on the estimates for pacing mentioned in Section VIII.C.II.B. and detailed further in Appendix A at the end of this section and displayed in Table VIII.C.15., OSHA estimates that with the implementation of scheduled rest breaks at the high heat trigger, employees in Group 2 (i.e., that are currently noncompliant with only scheduled rest breaks and currently compliant with if-needed rest breaks) will now behave like those in Group 3 and for those employees pacing is reduced by 39.5 – 8.4 = 31.1 minutes per shift. This reduction in pacing (i.e., increase in worker efficiency) translates into 31.1/47 = 66.17 percent of the unit time-cost of 47 minutes.[70] (31.1/41 = 75.85 percent out of the unit time-cost of 41 minutes.[71]) saved for outdoor (indoor) employees that are currently in Group 2..[72]

Table VIII.C.15. Labor Productivity Loss from Spent Pacing at High Heat Trigger Before and After Implementation of Required If-needed and Scheduled Rest Breaks per 8-Hour Shift per Employee

Group	Group Description	Labor Productivity Loss from Pacing at Before Required High Heat Trigger	Labor Productivity Loss from Pacing After Required High Heat Trigger Rest Breaks (Minutes)	Estimated Labor Cost Savings (Minutes)

[70] 2x(15-minute scheduled break + 4-minute travel time) + 1x(5-minute if-needed rest break + 4-minute travel time).
[71] 2x(15-minute scheduled break + 2-minute travel time) + 1x(5-minute if-needed rest break + 2-minute travel time).
[72] For Group 2 as well as Group 1, for presentation purposes, the denominator over which unit time cost savings is translated as a share of the unit time cost of high heat trigger rest breaks is presented as 47 minutes for outdoor employees (41 minutes for indoor employees). The fact that employees in Group 2 are already spending some portion of the 47 minutes or 41 minutes in if-needed rest breaks is already reflected in the estimated (state-level) share of employees in Group 2, which is equivalent to the difference between the (state-level) non-compliance rate for high heat trigger rest breaks (scheduled as well as if-needed rest breaks) and the (state-level) non-compliance rate for initial heat trigger rest breaks (if-needed rest breaks). Most of the employees in Group 2 (approximately 74 percent) are estimated to be already taking if-needed rest breaks but not scheduled breaks. The rest of the employees in Group 2 are, in addition to if-needed rest breaks, also already taking partial scheduled breaks that fall short of (i.e., are not fully compliant with) the scheduled breaks that are required in the proposed standard. The purpose of such classification of employees already taking partial scheduled breaks as part of Group 2 (employees at establishments that do not have required rest breaks for when the high heat trigger is met or exceeded) is to avoid overcomplicating the computation and presentation of the cost savings. Such classification may potentially result in the overestimation of cost savings from the high heat trigger rest breaks. However, as mentioned throughout this section, there are also reasons why the cost savings are also potentially underestimated (e.g., due to temperature data limitations as mentioned in Section VIII.C.II.B.).

		Rest Breaks (Minutes)		
Group 1	Employees at establishments that do not currently provide any rest breaks.	40.6	8.4	32.2
Group 2	Employees at establishments that provide rest breaks that meet the initial heat trigger rest break requirements.	39.5	8.4	31.1
Group 3	Employees at establishments that provide rest breaks that meet the initial and high heat trigger rest break requirements.	8.4	8.4	0.0

Source: OSHA estimate.
Note: OSHA estimates that approximately 6.1 percent of employees are in Group 1, 46.9 percent are in Group 2, and 47.0 percent are in Group 3.

II. Observation for Signs and Symptoms.

Employers would be required to observe employees for signs and symptoms of heat-related illness at or above the high heat trigger. The proposed standard provides options for complying with this requirement, including a mandatory buddy system and observation of employees by a supervisor or heat safety coordinator. Additionally, the proposed standard has a provision for communication with employees who are lone workers every 2 hours. OSHA assumes that all employers will use supervisors[73] to conduct observation of employees[74] (with one supervisor or heat safety coordinator responsible for observing no more than 20 employees). OSHA estimates this option would require 15 seconds of the designated person's time three times per employee for

[73] For this analysis, OSHA uses the wages developed for designated persons to represent supervisors' time as well.
[74] OSHA was unable to estimate the number of affected lone workers. OSHA assumes that the cost of lone workers communication with supervisors is the same as the cost of observation for the purposes of this analysis. The agency welcomes comment on this assumption and additional data that would allow OSHA to better estimate the costs for communication with lone workers.

every 8-hour shift that meets or exceeds the high heat trigger. This observation requirement would also take 15 seconds of each at-risk worker's time three times for every 8-hour shift that meets or exceeds the high heat trigger.

III. Hazard Alert.

When the high heat trigger is met or exceeded, OSHA would require employers to notify employees of the importance of staying hydrated, their right to take breaks, procedures to take in a heat emergency, and the locations of break areas and drinking water (for mobile work sites). OSHA estimates that it would take five minutes one time for a designated person to prepare and deliver the first notification message to employees for the year or heat season, and that for each subsequent notification, the designated person will use the same format and spend 30 seconds to update and resend the alert for each 8-hour shift at or above the initial heat trigger. OSHA assumes the time for at-risk workers to review the hazard alert is negligible and thus is not estimated to require any time.

IV. Warning Signs for Excessively High Heat Areas.

For indoor workplaces, employers would be required to place warning signs at areas with ambient temperatures that regularly exceed 120°F. OSHA assumes that this requirement imposes costs only to certain industries that are likely to have radiant heat sources (e.g., furnaces, hot water systems, ovens, smelting processes). OSHA assumes that this control would require 1-2 warning signs for each establishment in industries where radiant heat sources are likely present (or an average of 1.5 signs per establishment). OSHA estimates it would take a designated person 5 minutes to install each sign.

Table VIII.C.16. shows the unit costs for the requirements under the high heat trigger conditions by industry sector. The rest break unit costs reported in Table VIII.C.16. do not reflect the cost savings offset discussed above. Table VIII.C.17. shows the equipment costs that employers would incur in order to comply with the requirements when the high heat trigger is met or exceeded.

Table VIII.C.16. Labor-Based Unit Costs - Requirements at or Above the High Heat Trigger (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
Rest Breaks at High Heat Trigger – Indoor					
11	0.68	$18.31	At-Risk Worker	Employee	Daily at High Heat Trigger
21	0.68	$31.74	At-Risk Worker	Employee	Daily at High Heat Trigger
22	0.68	$51.61	At-Risk Worker	Employee	Daily at High Heat Trigger
23	0.68	$30.03	At-Risk Worker	Employee	Daily at High Heat Trigger
31-33	0.68	$25.07	At-Risk Worker	Employee	Daily at High Heat Trigger
42	0.68	$28.93	At-Risk Worker	Employee	Daily at High Heat Trigger
44-45	0.68	$17.96	At-Risk Worker	Employee	Daily at High Heat Trigger
48-49	0.68	$22.74	At-Risk Worker	Employee	Daily at High Heat Trigger
51	0.68	$39.32	At-Risk Worker	Employee	Daily at High Heat Trigger
52	0.68	$39.80	At-Risk Worker	Employee	Daily at High Heat Trigger
53	0.68	$25.58	At-Risk Worker	Employee	Daily at High Heat Trigger
54	0.68	$52.16	At-Risk Worker	Employee	Daily at High Heat Trigger
55	0.68	$60.15	At-Risk Worker	Employee	Daily at High Heat Trigger
56	0.68	$18.84	At-Risk Worker	Employee	Daily at High Heat Trigger
61	0.68	$22.33	At-Risk Worker	Employee	Daily at High Heat Trigger
62	0.68	$19.46	At-Risk Worker	Employee	Daily at High Heat Trigger
71	0.68	$17.23	At-Risk Worker	Employee	Daily at High Heat Trigger
72	0.68	$16.49	At-Risk Worker	Employee	Daily at High Heat Trigger
81	0.68	$23.46	At-Risk Worker	Employee	Daily at High Heat Trigger
92	0.68	$34.66	At-Risk Worker	Employee	Daily at High Heat Trigger
Rest Breaks at High Heat Trigger – Outdoor					
11	0.78	$20.99	At-Risk Worker	Employee	Daily at High Heat Trigger
21	0.78	$36.39	At-Risk Worker	Employee	Daily at High Heat Trigger
22	0.78	$59.17	At-Risk Worker	Employee	Daily at High Heat Trigger
23	0.78	$34.43	At-Risk Worker	Employee	Daily at High Heat Trigger

Disclaimer: This proposed rule has been submitted to the Office of the Federal Register (OFR) for publication, and is currently pending placement on public inspection at the OFR and publication in the Federal Register. This draft version of the proposed rule may vary slightly from the published document if minor technical or formatting changes are made during the OFR review process. Only the version published in the Federal Register is the official proposed rule.

Table VIII.C.16. Labor-Based Unit Costs - Requirements at or Above the High Heat Trigger (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
31-33	0.78	$28.73	At-Risk Worker	Employee	Daily at High Heat Trigger
42	0.78	$33.17	At-Risk Worker	Employee	Daily at High Heat Trigger
44-45	0.78	$20.59	At-Risk Worker	Employee	Daily at High Heat Trigger
48-49	0.78	$26.06	At-Risk Worker	Employee	Daily at High Heat Trigger
51	0.78	$45.07	At-Risk Worker	Employee	Daily at High Heat Trigger
52	0.78	$45.62	At-Risk Worker	Employee	Daily at High Heat Trigger
53	0.78	$29.33	At-Risk Worker	Employee	Daily at High Heat Trigger
54	0.78	$59.80	At-Risk Worker	Employee	Daily at High Heat Trigger
55	0.78	$68.95	At-Risk Worker	Employee	Daily at High Heat Trigger
56	0.78	$21.59	At-Risk Worker	Employee	Daily at High Heat Trigger
61	0.78	$25.60	At-Risk Worker	Employee	Daily at High Heat Trigger
62	0.78	$22.31	At-Risk Worker	Employee	Daily at High Heat Trigger
71	0.78	$19.75	At-Risk Worker	Employee	Daily at High Heat Trigger
72	0.78	$18.90	At-Risk Worker	Employee	Daily at High Heat Trigger
81	0.78	$26.89	At-Risk Worker	Employee	Daily at High Heat Trigger
92	0.78	$39.73	At-Risk Worker	Employee	Daily at High Heat Trigger
Observation for Signs and Symptoms – Designated Person					
11	0.01	$0.62	Designated Person	Employee	Daily at High Heat Trigger
21	0.01	$1.03	Designated Person	Employee	Daily at High Heat Trigger
22	0.01	$1.17	Designated Person	Employee	Daily at High Heat Trigger
23	0.01	$0.86	Designated Person	Employee	Daily at High Heat Trigger
31-33	0.01	$0.87	Designated Person	Employee	Daily at High Heat Trigger
42	0.01	$0.86	Designated Person	Employee	Daily at High Heat Trigger
44-45	0.01	$0.54	Designated Person	Employee	Daily at High Heat Trigger
48-49	0.01	$0.76	Designated Person	Employee	Daily at High Heat Trigger
51	0.01	$1.11	Designated Person	Employee	Daily at High Heat Trigger
52	0.01	$1.01	Designated Person	Employee	Daily at High Heat Trigger
53	0.01	$0.75	Designated Person	Employee	Daily at High Heat Trigger
54	0.01	$1.20	Designated Person	Employee	Daily at High Heat Trigger
55	0.01	$1.23	Designated Person	Employee	Daily at High Heat Trigger
56	0.01	$0.70	Designated Person	Employee	Daily at High Heat Trigger
61	0.01	$0.74	Designated Person	Employee	Daily at High Heat Trigger
62	0.01	$0.70	Designated Person	Employee	Daily at High Heat Trigger
71	0.01	$0.58	Designated Person	Employee	Daily at High Heat Trigger
72	0.01	$0.42	Designated Person	Employee	Daily at High Heat Trigger
81	0.01	$0.68	Designated Person	Employee	Daily at High Heat Trigger
92	0.01	$0.91	Designated Person	Employee	Daily at High Heat Trigger
Observation for Signs and Symptoms – At–Risk Worker					
11	0.01	$0.33	At-Risk Worker	Employee	Daily at High Heat Trigger
21	0.01	$0.58	At-Risk Worker	Employee	Daily at High Heat Trigger
22	0.01	$0.94	At-Risk Worker	Employee	Daily at High Heat Trigger

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Table VIII.C.16. Labor-Based Unit Costs - Requirements at or Above the High Heat Trigger (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
23	0.01	$0.55	At-Risk Worker	Employee	Daily at High Heat Trigger
31-33	0.01	$0.46	At-Risk Worker	Employee	Daily at High Heat Trigger
42	0.01	$0.53	At-Risk Worker	Employee	Daily at High Heat Trigger
44-45	0.01	$0.33	At-Risk Worker	Employee	Daily at High Heat Trigger
48-49	0.01	$0.42	At-Risk Worker	Employee	Daily at High Heat Trigger
51	0.01	$0.72	At-Risk Worker	Employee	Daily at High Heat Trigger
52	0.01	$0.73	At-Risk Worker	Employee	Daily at High Heat Trigger
53	0.01	$0.47	At-Risk Worker	Employee	Daily at High Heat Trigger
54	0.01	$0.95	At-Risk Worker	Employee	Daily at High Heat Trigger
55	0.01	$1.10	At-Risk Worker	Employee	Daily at High Heat Trigger
56	0.01	$0.34	At-Risk Worker	Employee	Daily at High Heat Trigger
61	0.01	$0.41	At-Risk Worker	Employee	Daily at High Heat Trigger
62	0.01	$0.36	At-Risk Worker	Employee	Daily at High Heat Trigger
71	0.01	$0.32	At-Risk Worker	Employee	Daily at High Heat Trigger
72	0.01	$0.30	At-Risk Worker	Employee	Daily at High Heat Trigger
81	0.01	$0.43	At-Risk Worker	Employee	Daily at High Heat Trigger
92	0.01	$0.63	At-Risk Worker	Employee	Daily at High Heat Trigger
Initial Hazard Alert – Supervisor					
11	0.08	$4.15	Designated Person	Establishment	Annual
21	0.08	$6.86	Designated Person	Establishment	Annual
22	0.08	$7.83	Designated Person	Establishment	Annual
23	0.08	$5.71	Designated Person	Establishment	Annual
31-33	0.08	$5.83	Designated Person	Establishment	Annual
42	0.08	$5.73	Designated Person	Establishment	Annual
44-45	0.08	$3.57	Designated Person	Establishment	Annual
48-49	0.08	$5.05	Designated Person	Establishment	Annual
51	0.08	$7.40	Designated Person	Establishment	Annual
52	0.08	$6.75	Designated Person	Establishment	Annual
53	0.08	$4.99	Designated Person	Establishment	Annual
54	0.08	$7.97	Designated Person	Establishment	Annual
55	0.08	$8.22	Designated Person	Establishment	Annual
56	0.08	$4.66	Designated Person	Establishment	Annual
61	0.08	$4.96	Designated Person	Establishment	Annual
62	0.08	$4.66	Designated Person	Establishment	Annual
71	0.08	$3.90	Designated Person	Establishment	Annual
72	0.08	$2.77	Designated Person	Establishment	Annual
81	0.08	$4.54	Designated Person	Establishment	Annual
92	0.08	$6.09	Designated Person	Establishment	Annual
Subsequent Hazard Alert – Supervisor					
11	0.01	$0.42	Designated Person	Establishment	Daily at High Heat Trigger
21	0.01	$0.69	Designated Person	Establishment	Daily at High Heat Trigger

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Table VIII.C.16. Labor-Based Unit Costs - Requirements at or Above the High Heat Trigger (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
22	0.01	$0.78	Designated Person	Establishment	Daily at High Heat Trigger
23	0.01	$0.57	Designated Person	Establishment	Daily at High Heat Trigger
31-33	0.01	$0.58	Designated Person	Establishment	Daily at High Heat Trigger
42	0.01	$0.57	Designated Person	Establishment	Daily at High Heat Trigger
44-45	0.01	$0.36	Designated Person	Establishment	Daily at High Heat Trigger
48-49	0.01	$0.50	Designated Person	Establishment	Daily at High Heat Trigger
51	0.01	$0.74	Designated Person	Establishment	Daily at High Heat Trigger
52	0.01	$0.67	Designated Person	Establishment	Daily at High Heat Trigger
53	0.01	$0.50	Designated Person	Establishment	Daily at High Heat Trigger
54	0.01	$0.80	Designated Person	Establishment	Daily at High Heat Trigger
55	0.01	$0.82	Designated Person	Establishment	Daily at High Heat Trigger
56	0.01	$0.47	Designated Person	Establishment	Daily at High Heat Trigger
61	0.01	$0.50	Designated Person	Establishment	Daily at High Heat Trigger
62	0.01	$0.47	Designated Person	Establishment	Daily at High Heat Trigger
71	0.01	$0.39	Designated Person	Establishment	Daily at High Heat Trigger
72	0.01	$0.28	Designated Person	Establishment	Daily at High Heat Trigger
81	0.01	$0.45	Designated Person	Establishment	Daily at High Heat Trigger
92	0.01	$0.61	Designated Person	Establishment	Daily at High Heat Trigger
Signage Placement					
11	0.08	$4.15	Designated Person	Establishment	One-Time
21	0.08	$6.86	Designated Person	Establishment	One-Time
22	0.08	$7.83	Designated Person	Establishment	One-Time
23	0.08	$5.71	Designated Person	Establishment	One-Time
31-33	0.08	$5.83	Designated Person	Establishment	One-Time
42	0.08	$5.73	Designated Person	Establishment	One-Time
44-45	0.08	$3.57	Designated Person	Establishment	One-Time
48-49	0.08	$5.05	Designated Person	Establishment	One-Time
51	0.08	$7.40	Designated Person	Establishment	One-Time
52	0.08	$6.75	Designated Person	Establishment	One-Time
53	0.08	$4.99	Designated Person	Establishment	One-Time
54	0.08	$7.97	Designated Person	Establishment	One-Time
55	0.08	$8.22	Designated Person	Establishment	One-Time
56	0.08	$4.66	Designated Person	Establishment	One-Time
61	0.08	$4.96	Designated Person	Establishment	One-Time
62	0.08	$4.66	Designated Person	Establishment	One-Time
71	0.08	$3.90	Designated Person	Establishment	One-Time
72	0.08	$2.77	Designated Person	Establishment	One-Time
81	0.08	$4.54	Designated Person	Establishment	One-Time
92	0.08	$6.09	Designated Person	Establishment	One-Time

Source: OSHA estimate derived from BLS, 2023c; BLS, 2024b; O*NET, 2023; EPA, 2002; and Rice, 2002.

Table VIII.C.17. Equipment-Based Unit Costs – Requirements at or Above the High Heat Trigger (2023$)

Item	Units	Unit Cost	Total Cost per Unit	Basis	Frequency
Warning Signs	1.5	$13.50	$20.25	Establishment	One-Time

Source: OSHA based on SafetySign.com, 2024.

F. Heat Illness and Emergency Response and Planning.

In addition to requirements for a heat emergency response plan that employers must include in their HIIPP, OSHA would require employers to undertake certain activities for any at-risk worker experiencing signs and symptoms of heat-related illness, including requiring immediate action appropriate to the severity of the illness or emergency. There are other methods to cool an individual experiencing a heat emergency, but OSHA is estimating costs here assuming that employers will implement the method recommended by the U.S. Army (Department of the Army, 2023). The agency welcomes comment on this issue and information on methods currently used for cooling.

In the case of a non-emergency heat-related illness, OSHA estimates that a designated person will spend 45 minutes per incident monitoring the employee. When an employee is suspected of a heat emergency, the proposed standard would require immediate action to reduce body temperature. OSHA estimates this would take 12.5 minutes per incident (based on Casa et al., 2007), accompanied by an immediate call to emergency medical services (EMS) taking an estimated 2 minutes.[75] For any employee experiencing a heat emergency working in a location that is off a roadway that needs EMS, a designated person will spend time transporting the employee to a location where EMS can reach them. OSHA estimated that, on average, it will take a designated person

[75] OSHA estimates that a heat emergency will require less time from a designated person because, in a heat emergency, the affected employee will be transported to a medical facility by EMS rather than monitored for the duration at the work site.

30 minutes to transport an employee per incident.[76] Finally, OSHA would require employers to have a way to reduce an employee's body temperature when necessary. OSHA assumes that employers will use two sets of four bed sheets[77] that have been wetted and cooled per employee experiencing a heat emergency, with one set on the employee and one set in a cooler such that they can be swapped every three minutes. OSHA further assumes that employers will need to have supplies on hand to potentially handle two incidents concurrently. In all, this means that an employer would need 16 sheets (8 per individual to cool two individuals, where four sheets can be cooled while four are used which can then be switched and reused in a cycle of cooling then using the sheets) and two coolers at their establishment, as well as six seven-pound bags of ice[78] for each 8-hour shift that meets or exceeds the initial heat trigger.

See Table VIII.C.6. for anticipated annual incidence rates by sector used in this analysis. Table VIII.C.18. shows the unit costs for the requirements to respond to and plan for heat-related illnesses by severity of illness and industry sector. Table VIII.C.19. shows the equipment costs that employers would incur in order to perform emergency response procedures in the event of a heat-related illness by severity of illness (emergency or non-emergency).

Table VIII.C.18. Labor-Based Unit Costs – Heat Illness and Emergency Response and Planning (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
Medical Response – Non–Emergency					

[76] This time estimate includes time for the designated person to return to the work site.
[77] This assumption is based on guidance from the U.S. Army on treatment of heat casualties. The guidance suggests treating an ill person with two sheets, one to wrap their body and the other for their head, and to rotate between four sets of two sheets every three minutes (Department of the Army, 2023).
[78] OSHA assumes that approximately 50 percent of employers will make and/or store ice on their premises using existing freezers and/or ice machines.

Table VIII.C.18. Labor-Based Unit Costs – Heat Illness and Emergency Response and Planning (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
11	0.75	$37.37	Designated Person	Incident	Annual
21	0.75	$61.74	Designated Person	Incident	Annual
22	0.75	$70.46	Designated Person	Incident	Annual
23	0.75	$51.39	Designated Person	Incident	Annual
31-33	0.75	$52.48	Designated Person	Incident	Annual
42	0.75	$51.58	Designated Person	Incident	Annual
44-45	0.75	$32.17	Designated Person	Incident	Annual
48-49	0.75	$45.44	Designated Person	Incident	Annual
51	0.75	$66.58	Designated Person	Incident	Annual
52	0.75	$60.73	Designated Person	Incident	Annual
53	0.75	$44.93	Designated Person	Incident	Annual
54	0.75	$71.75	Designated Person	Incident	Annual
55	0.75	$73.96	Designated Person	Incident	Annual
56	0.75	$41.97	Designated Person	Incident	Annual
61	0.75	$44.61	Designated Person	Incident	Annual
62	0.75	$41.94	Designated Person	Incident	Annual
71	0.75	$35.06	Designated Person	Incident	Annual
72	0.75	$24.93	Designated Person	Incident	Annual
81	0.75	$40.84	Designated Person	Incident	Annual
92	0.75	$54.83	Designated Person	Incident	Annual
Medical Response – Emergency					
11	0.21	$10.38	Designated Person	Incident	Annual
21	0.21	$17.15	Designated Person	Incident	Annual
22	0.21	$19.57	Designated Person	Incident	Annual
23	0.21	$14.28	Designated Person	Incident	Annual
31-33	0.21	$14.58	Designated Person	Incident	Annual
42	0.21	$14.33	Designated Person	Incident	Annual
44-45	0.21	$8.94	Designated Person	Incident	Annual
48-49	0.21	$12.62	Designated Person	Incident	Annual
51	0.21	$18.50	Designated Person	Incident	Annual
52	0.21	$16.87	Designated Person	Incident	Annual
53	0.21	$12.48	Designated Person	Incident	Annual
54	0.21	$19.93	Designated Person	Incident	Annual
55	0.21	$20.55	Designated Person	Incident	Annual
56	0.21	$11.66	Designated Person	Incident	Annual
61	0.21	$12.39	Designated Person	Incident	Annual
62	0.21	$11.65	Designated Person	Incident	Annual
71	0.21	$9.74	Designated Person	Incident	Annual
72	0.21	$6.93	Designated Person	Incident	Annual
81	0.21	$11.34	Designated Person	Incident	Annual
92	0.21	$15.23	Designated Person	Incident	Annual

Table VIII.C.18. Labor-Based Unit Costs – Heat Illness and Emergency Response and Planning (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
Contact Emergency Medical Services					
11	0.03	$1.66	Designated Person	Incident	Annual
21	0.03	$2.74	Designated Person	Incident	Annual
22	0.03	$3.13	Designated Person	Incident	Annual
23	0.03	$2.28	Designated Person	Incident	Annual
31-33	0.03	$2.33	Designated Person	Incident	Annual
42	0.03	$2.29	Designated Person	Incident	Annual
44-45	0.03	$1.43	Designated Person	Incident	Annual
48-49	0.03	$2.02	Designated Person	Incident	Annual
51	0.03	$2.96	Designated Person	Incident	Annual
52	0.03	$2.70	Designated Person	Incident	Annual
53	0.03	$2.00	Designated Person	Incident	Annual
54	0.03	$3.19	Designated Person	Incident	Annual
55	0.03	$3.29	Designated Person	Incident	Annual
56	0.03	$1.87	Designated Person	Incident	Annual
61	0.03	$1.98	Designated Person	Incident	Annual
62	0.03	$1.86	Designated Person	Incident	Annual
71	0.03	$1.56	Designated Person	Incident	Annual
72	0.03	$1.11	Designated Person	Incident	Annual
81	0.03	$1.82	Designated Person	Incident	Annual
92	0.03	$2.44	Designated Person	Incident	Annual
Transport Worker					
11	0.50	$24.92	Designated Person	Incident	Annual
21	0.50	$41.16	Designated Person	Incident	Annual
22	0.50	$46.97	Designated Person	Incident	Annual
23	0.50	$34.26	Designated Person	Incident	Annual
31-33	0.50	$34.99	Designated Person	Incident	Annual
42	0.50	$34.39	Designated Person	Incident	Annual
44-45	0.50	$21.45	Designated Person	Incident	Annual
48-49	0.50	$30.30	Designated Person	Incident	Annual
51	0.50	$44.39	Designated Person	Incident	Annual
52	0.50	$40.49	Designated Person	Incident	Annual
53	0.50	$29.95	Designated Person	Incident	Annual
54	0.50	$47.83	Designated Person	Incident	Annual
55	0.50	$49.31	Designated Person	Incident	Annual
56	0.50	$27.98	Designated Person	Incident	Annual
61	0.50	$29.74	Designated Person	Incident	Annual
62	0.50	$27.96	Designated Person	Incident	Annual
71	0.50	$23.37	Designated Person	Incident	Annual
72	0.50	$16.62	Designated Person	Incident	Annual
81	0.50	$27.23	Designated Person	Incident	Annual

Table VIII.C.18. Labor-Based Unit Costs – Heat Illness and Emergency Response and Planning (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
92	0.50	$36.55	Designated Person	Incident	Annual

Source: OSHA estimate derived from BLS, 2023c; BLS, 2024b; O*NET, 2023; EPA, 2002; and Rice, 2002.

Table VIII.C.19. Equipment-Based Unit Costs – Heat Illness and Emergency Response and Planning (2023$)

Item	Units	Unit Cost	Total Cost	Basis	Frequency
Ice Sheets	16.0	$9.99	$159.84	Establishment	One-Time
Ice	6.0	$0.69[a]	$4.14	Establishment	Daily at Initial Heat Trigger
Ice Cooler	2.0	$31.70	$63.40	Establishment	One-Time

Source: OSHA based on Amazon.com, Inc., 2024c; W.W. Grainger, Inc., 2024; and Walmart Inc., 2024.
[a] Under the assumption that approximately 50 percent of employers will make and/or store ice on their premises using existing freezers and/or ice machines, half of the unit cost of a seven-pound bags of ice = $ 1.38/2 = $0.69 is reported.

G. Training.

The proposed standard would require employers to develop and implement a training program for employees and supervisors. Training would be required at certain frequencies, including initially (e.g., prior to any work at or above the initial heat trigger), annual refresher training, and supplemental training when necessary (e.g., following each heat-related incident at the work site, new job tasks, or changes in employer policies and procedures). OSHA assumes the training program would be developed and implemented by a designated person.

OSHA estimates a designated person would spend four hours developing the initial employee training program, 30 minutes preparing for the initial employee training sessions, and one hour administering each initial training session.[79] OSHA estimates that

[79] OSHA expects to provide training materials and templates. To the extent that employers are able to incorporate and develop training using those materials and templates, this estimate may overstate the amount of time needed to develop training. OSHA welcomes comment on this issue, how training is generally developed, how long that development takes, and/or information about any other costs related to training development.

a designated person would spend 15 minutes preparing for the refresher employee training(s) and 30 minutes conducting each refresher employee training. Finally, OSHA estimates that all employees would spend one hour each for the initial employee training and 30 minutes each for every refresher employee training.

For the supervisor and heat safety coordinator training, OSHA estimates that a designated person would spend four hours developing the initial training, 15 minutes preparing, and one hour per session to deliver the initial supervisor training. OSHA estimates that each supervisor and heat safety coordinator would spend one hour attending the supervisor training. For supervisor refresher training, OSHA estimates that a designated person would spend 15 minutes preparing for the refresher training and 30 minutes conducting the refresher training. Each supervisor and heat safety coordinator would spend 30 minutes attending the supervisor refresher training.

Finally, OSHA estimates that a designated person would spend 15 minutes preparing supplemental employee training and 30 minutes conducting each supplemental employee training. Each employee would spend 30 minutes attending the employee supplemental training. For this analysis, OSHA assumes that these supplemental trainings would be conducted by one percent of establishments each year and that one percent of employees would attend these supplemental trainings.

Table VIII.C.20. shows the unit costs for the training requirements by industry sector.

Table VIII.C.20. Labor-Based Unit Costs – Training (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
Initial Employee Training Development					
11	4.0	$199.32	Designated Person	Establishment	One-Time

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Table VIII.C.20. Labor-Based Unit Costs – Training (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
21	4.0	$329.25	Designated Person	Establishment	One-Time
22	4.0	$375.78	Designated Person	Establishment	One-Time
23	4.0	$274.10	Designated Person	Establishment	One-Time
31-33	4.0	$279.88	Designated Person	Establishment	One-Time
42	4.0	$275.09	Designated Person	Establishment	One-Time
44-45	4.0	$171.57	Designated Person	Establishment	One-Time
48-49	4.0	$242.37	Designated Person	Establishment	One-Time
51	4.0	$355.11	Designated Person	Establishment	One-Time
52	4.0	$323.91	Designated Person	Establishment	One-Time
53	4.0	$239.62	Designated Person	Establishment	One-Time
54	4.0	$382.66	Designated Person	Establishment	One-Time
55	4.0	$394.46	Designated Person	Establishment	One-Time
56	4.0	$223.87	Designated Person	Establishment	One-Time
61	4.0	$237.94	Designated Person	Establishment	One-Time
62	4.0	$223.70	Designated Person	Establishment	One-Time
71	4.0	$187.00	Designated Person	Establishment	One-Time
72	4.0	$132.96	Designated Person	Establishment	One-Time
81	4.0	$217.82	Designated Person	Establishment	One-Time
92	4.0	$292.41	Designated Person	Establishment	One-Time
Initial Employee Training – Designated Person					
11	1.50	$74.75	Designated Person	Establishment	One-Time
21	1.50	$123.47	Designated Person	Establishment	One-Time
22	1.50	$140.92	Designated Person	Establishment	One-Time
23	1.50	$102.79	Designated Person	Establishment	One-Time
31-33	1.50	$104.96	Designated Person	Establishment	One-Time
42	1.50	$103.16	Designated Person	Establishment	One-Time
44-45	1.50	$64.34	Designated Person	Establishment	One-Time
48-49	1.50	$90.89	Designated Person	Establishment	One-Time
51	1.50	$133.17	Designated Person	Establishment	One-Time
52	1.50	$121.46	Designated Person	Establishment	One-Time
53	1.50	$89.86	Designated Person	Establishment	One-Time
54	1.50	$143.50	Designated Person	Establishment	One-Time
55	1.50	$147.92	Designated Person	Establishment	One-Time
56	1.50	$83.95	Designated Person	Establishment	One-Time
61	1.50	$89.23	Designated Person	Establishment	One-Time
62	1.50	$83.89	Designated Person	Establishment	One-Time
71	1.50	$70.12	Designated Person	Establishment	One-Time
72	1.50	$49.86	Designated Person	Establishment	One-Time
81	1.50	$81.68	Designated Person	Establishment	One-Time
92	1.50	$109.66	Designated Person	Establishment	One-Time
Initial Employee Training – At-Risk Worker					
11	1.0	$26.80	At-Risk Worker	Employee	One-Time

Table VIII.C.20. Labor-Based Unit Costs – Training (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
21	1.0	$46.46	At-Risk Worker	Employee	One-Time
22	1.0	$75.53	At-Risk Worker	Employee	One-Time
23	1.0	$43.95	At-Risk Worker	Employee	One-Time
31-33	1.0	$36.68	At-Risk Worker	Employee	One-Time
42	1.0	$42.34	At-Risk Worker	Employee	One-Time
44-45	1.0	$26.28	At-Risk Worker	Employee	One-Time
48-49	1.0	$33.27	At-Risk Worker	Employee	One-Time
51	1.0	$57.54	At-Risk Worker	Employee	One-Time
52	1.0	$58.24	At-Risk Worker	Employee	One-Time
53	1.0	$37.44	At-Risk Worker	Employee	One-Time
54	1.0	$76.34	At-Risk Worker	Employee	One-Time
55	1.0	$88.02	At-Risk Worker	Employee	One-Time
56	1.0	$27.56	At-Risk Worker	Employee	One-Time
61	1.0	$32.68	At-Risk Worker	Employee	One-Time
62	1.0	$28.48	At-Risk Worker	Employee	One-Time
71	1.0	$25.21	At-Risk Worker	Employee	One-Time
72	1.0	$24.13	At-Risk Worker	Employee	One-Time
81	1.0	$34.33	At-Risk Worker	Employee	One-Time
92	1.0	$50.72	At-Risk Worker	Employee	One-Time
Initial Supervisor Training Development					
11	2.0	$99.66	Designated Person	Establishment	One-Time
21	2.0	$164.63	Designated Person	Establishment	One-Time
22	2.0	$187.89	Designated Person	Establishment	One-Time
23	2.0	$137.05	Designated Person	Establishment	One-Time
31-33	2.0	$139.94	Designated Person	Establishment	One-Time
42	2.0	$137.55	Designated Person	Establishment	One-Time
44-45	2.0	$85.78	Designated Person	Establishment	One-Time
48-49	2.0	$121.18	Designated Person	Establishment	One-Time
51	2.0	$177.56	Designated Person	Establishment	One-Time
52	2.0	$161.95	Designated Person	Establishment	One-Time
53	2.0	$119.81	Designated Person	Establishment	One-Time
54	2.0	$191.33	Designated Person	Establishment	One-Time
55	2.0	$197.23	Designated Person	Establishment	One-Time
56	2.0	$111.93	Designated Person	Establishment	One-Time
61	2.0	$118.97	Designated Person	Establishment	One-Time
62	2.0	$111.85	Designated Person	Establishment	One-Time
71	2.0	$93.50	Designated Person	Establishment	One-Time
72	2.0	$66.48	Designated Person	Establishment	One-Time
81	2.0	$108.91	Designated Person	Establishment	One-Time
92	2.0	$146.21	Designated Person	Establishment	One-Time
Initial Supervisor Training – Supervisor					
11	1.25	$62.29	Designated Person	Establishment	One-Time

Table VIII.C.20. Labor-Based Unit Costs – Training (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
21	1.25	$102.89	Designated Person	Establishment	One-Time
22	1.25	$117.43	Designated Person	Establishment	One-Time
23	1.25	$85.66	Designated Person	Establishment	One-Time
31-33	1.25	$87.46	Designated Person	Establishment	One-Time
42	1.25	$85.97	Designated Person	Establishment	One-Time
44-45	1.25	$53.61	Designated Person	Establishment	One-Time
48-49	1.25	$75.74	Designated Person	Establishment	One-Time
51	1.25	$110.97	Designated Person	Establishment	One-Time
52	1.25	$101.22	Designated Person	Establishment	One-Time
53	1.25	$74.88	Designated Person	Establishment	One-Time
54	1.25	$119.58	Designated Person	Establishment	One-Time
55	1.25	$123.27	Designated Person	Establishment	One-Time
56	1.25	$69.96	Designated Person	Establishment	One-Time
61	1.25	$74.36	Designated Person	Establishment	One-Time
62	1.25	$69.91	Designated Person	Establishment	One-Time
71	1.25	$58.44	Designated Person	Establishment	One-Time
72	1.25	$41.55	Designated Person	Establishment	One-Time
81	1.25	$68.07	Designated Person	Establishment	One-Time
92	1.25	$91.38	Designated Person	Establishment	One-Time
Initial Supervisor Training – Designated Person					
11	1.0	$49.83	Designated Person	Establishment	One-Time
21	1.0	$82.31	Designated Person	Establishment	One-Time
22	1.0	$93.94	Designated Person	Establishment	One-Time
23	1.0	$68.53	Designated Person	Establishment	One-Time
31-33	1.0	$69.97	Designated Person	Establishment	One-Time
42	1.0	$68.77	Designated Person	Establishment	One-Time
44-45	1.0	$42.89	Designated Person	Establishment	One-Time
48-49	1.0	$60.59	Designated Person	Establishment	One-Time
51	1.0	$88.78	Designated Person	Establishment	One-Time
52	1.0	$80.98	Designated Person	Establishment	One-Time
53	1.0	$59.91	Designated Person	Establishment	One-Time
54	1.0	$95.67	Designated Person	Establishment	One-Time
55	1.0	$98.62	Designated Person	Establishment	One-Time
56	1.0	$55.97	Designated Person	Establishment	One-Time
61	1.0	$59.49	Designated Person	Establishment	One-Time
62	1.0	$55.92	Designated Person	Establishment	One-Time
71	1.0	$46.75	Designated Person	Establishment	One-Time
72	1.0	$33.24	Designated Person	Establishment	One-Time
81	1.0	$54.45	Designated Person	Establishment	One-Time
92	1.0	$73.10	Designated Person	Establishment	One-Time
Annual Employee Refresher Training – Designated Person					
11	0.75	$37.37	Designated Person	Establishment	Annual

Table VIII.C.20. Labor-Based Unit Costs – Training (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
21	0.75	$61.74	Designated Person	Establishment	Annual
22	0.75	$70.46	Designated Person	Establishment	Annual
23	0.75	$51.39	Designated Person	Establishment	Annual
31-33	0.75	$52.48	Designated Person	Establishment	Annual
42	0.75	$51.58	Designated Person	Establishment	Annual
44-45	0.75	$32.17	Designated Person	Establishment	Annual
48-49	0.75	$45.44	Designated Person	Establishment	Annual
51	0.75	$66.58	Designated Person	Establishment	Annual
52	0.75	$60.73	Designated Person	Establishment	Annual
53	0.75	$44.93	Designated Person	Establishment	Annual
54	0.75	$71.75	Designated Person	Establishment	Annual
55	0.75	$73.96	Designated Person	Establishment	Annual
56	0.75	$41.97	Designated Person	Establishment	Annual
61	0.75	$44.61	Designated Person	Establishment	Annual
62	0.75	$41.94	Designated Person	Establishment	Annual
71	0.75	$35.06	Designated Person	Establishment	Annual
72	0.75	$24.93	Designated Person	Establishment	Annual
81	0.75	$40.84	Designated Person	Establishment	Annual
92	0.75	$54.83	Designated Person	Establishment	Annual
Annual Employee Refresher Training – At-Risk Worker					
11	0.50	$13.40	At-Risk Worker	Employee	Annual
21	0.50	$23.23	At-Risk Worker	Employee	Annual
22	0.50	$37.77	At-Risk Worker	Employee	Annual
23	0.50	$21.97	At-Risk Worker	Employee	Annual
31-33	0.50	$18.34	At-Risk Worker	Employee	Annual
42	0.50	$21.17	At-Risk Worker	Employee	Annual
44-45	0.50	$13.14	At-Risk Worker	Employee	Annual
48-49	0.50	$16.64	At-Risk Worker	Employee	Annual
51	0.50	$28.77	At-Risk Worker	Employee	Annual
52	0.50	$29.12	At-Risk Worker	Employee	Annual
53	0.50	$18.72	At-Risk Worker	Employee	Annual
54	0.50	$38.17	At-Risk Worker	Employee	Annual
55	0.50	$44.01	At-Risk Worker	Employee	Annual
56	0.50	$13.78	At-Risk Worker	Employee	Annual
61	0.50	$16.34	At-Risk Worker	Employee	Annual
62	0.50	$14.24	At-Risk Worker	Employee	Annual
71	0.50	$12.61	At-Risk Worker	Employee	Annual
72	0.50	$12.06	At-Risk Worker	Employee	Annual
81	0.50	$17.16	At-Risk Worker	Employee	Annual
92	0.50	$25.36	At-Risk Worker	Employee	Annual
Annual Supervisor Refresher Training – Supervisor					
11	0.63	$31.14	Designated Person	Establishment	Annual

Disclaimer: This proposed rule has been submitted to the Office of the Federal Register (OFR) for publication, and is currently pending placement on public inspection at the OFR and publication in the Federal Register. This draft version of the proposed rule may vary slightly from the published document if minor technical or formatting changes are made during the OFR review process. Only the version published in the Federal Register is the official proposed rule.

Table VIII.C.20. Labor-Based Unit Costs – Training (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
21	0.63	$51.45	Designated Person	Establishment	Annual
22	0.63	$58.72	Designated Person	Establishment	Annual
23	0.63	$42.83	Designated Person	Establishment	Annual
31-33	0.63	$43.73	Designated Person	Establishment	Annual
42	0.63	$42.98	Designated Person	Establishment	Annual
44-45	0.63	$26.81	Designated Person	Establishment	Annual
48-49	0.63	$37.87	Designated Person	Establishment	Annual
51	0.63	$55.49	Designated Person	Establishment	Annual
52	0.63	$50.61	Designated Person	Establishment	Annual
53	0.63	$37.44	Designated Person	Establishment	Annual
54	0.63	$59.79	Designated Person	Establishment	Annual
55	0.63	$61.64	Designated Person	Establishment	Annual
56	0.63	$34.98	Designated Person	Establishment	Annual
61	0.63	$37.18	Designated Person	Establishment	Annual
62	0.63	$34.95	Designated Person	Establishment	Annual
71	0.63	$29.22	Designated Person	Establishment	Annual
72	0.63	$20.78	Designated Person	Establishment	Annual
81	0.63	$34.03	Designated Person	Establishment	Annual
92	0.63	$45.69	Designated Person	Establishment	Annual
Annual Supervisor Refresher Training – Designated Person					
11	0.5	$24.92	Designated Person	Establishment	Annual
21	0.5	$41.16	Designated Person	Establishment	Annual
22	0.5	$46.97	Designated Person	Establishment	Annual
23	0.5	$34.26	Designated Person	Establishment	Annual
31-33	0.5	$34.99	Designated Person	Establishment	Annual
42	0.5	$34.39	Designated Person	Establishment	Annual
44-45	0.5	$21.45	Designated Person	Establishment	Annual
48-49	0.5	$30.30	Designated Person	Establishment	Annual
51	0.5	$44.39	Designated Person	Establishment	Annual
52	0.5	$40.49	Designated Person	Establishment	Annual
53	0.5	$29.95	Designated Person	Establishment	Annual
54	0.5	$47.83	Designated Person	Establishment	Annual
55	0.5	$49.31	Designated Person	Establishment	Annual
56	0.5	$27.98	Designated Person	Establishment	Annual
61	0.5	$29.74	Designated Person	Establishment	Annual
62	0.5	$27.96	Designated Person	Establishment	Annual
71	0.5	$23.37	Designated Person	Establishment	Annual
72	0.5	$16.62	Designated Person	Establishment	Annual
81	0.5	$27.23	Designated Person	Establishment	Annual
92	0.5	$36.55	Designated Person	Establishment	Annual
Supplemental Employee Refresher Training – Designated Person					
11	0.75	$37.37	Designated Person	Establishment	Annual

Table VIII.C.20. Labor-Based Unit Costs – Training (2023$)

Sector	Hours	Unit Cost	Labor Category	Basis	Frequency
21	0.75	$61.74	Designated Person	Establishment	Annual
22	0.75	$70.46	Designated Person	Establishment	Annual
23	0.75	$51.39	Designated Person	Establishment	Annual
31-33	0.75	$52.48	Designated Person	Establishment	Annual
42	0.75	$51.58	Designated Person	Establishment	Annual
44-45	0.75	$32.17	Designated Person	Establishment	Annual
48-49	0.75	$45.44	Designated Person	Establishment	Annual
51	0.75	$66.58	Designated Person	Establishment	Annual
52	0.75	$60.73	Designated Person	Establishment	Annual
53	0.75	$44.93	Designated Person	Establishment	Annual
54	0.75	$71.75	Designated Person	Establishment	Annual
55	0.75	$73.96	Designated Person	Establishment	Annual
56	0.75	$41.97	Designated Person	Establishment	Annual
61	0.75	$44.61	Designated Person	Establishment	Annual
62	0.75	$41.94	Designated Person	Establishment	Annual
71	0.75	$35.06	Designated Person	Establishment	Annual
72	0.75	$24.93	Designated Person	Establishment	Annual
81	0.75	$40.84	Designated Person	Establishment	Annual
92	0.75	$54.83	Designated Person	Establishment	Annual
Supplemental Employee Refresher Training – At-Risk Worker					
11	0.50	$13.40	At-Risk Worker	Employee	Annual
21	0.50	$23.23	At-Risk Worker	Employee	Annual
22	0.50	$37.77	At-Risk Worker	Employee	Annual
23	0.50	$21.97	At-Risk Worker	Employee	Annual
31-33	0.50	$18.34	At-Risk Worker	Employee	Annual
42	0.50	$21.17	At-Risk Worker	Employee	Annual
44-45	0.50	$13.14	At-Risk Worker	Employee	Annual
48-49	0.50	$16.64	At-Risk Worker	Employee	Annual
51	0.50	$28.77	At-Risk Worker	Employee	Annual
52	0.50	$29.12	At-Risk Worker	Employee	Annual
53	0.50	$18.72	At-Risk Worker	Employee	Annual
54	0.50	$38.17	At-Risk Worker	Employee	Annual
55	0.50	$44.01	At-Risk Worker	Employee	Annual
56	0.50	$13.78	At-Risk Worker	Employee	Annual
61	0.50	$16.34	At-Risk Worker	Employee	Annual
62	0.50	$14.24	At-Risk Worker	Employee	Annual
71	0.50	$12.61	At-Risk Worker	Employee	Annual
72	0.50	$12.06	At-Risk Worker	Employee	Annual
81	0.50	$17.16	At-Risk Worker	Employee	Annual
92	0.50	$25.36	At-Risk Worker	Employee	Annual

Source: OSHA estimate derived from BLS, 2023c; BLS, 2024b; O*NET, 2023; EPA, 2002; and Rice, 2002.

H. Recordkeeping.

The proposed standard would require that indoor work area measurements be retained for 6 months. OSHA assumes that employers would purchase a wireless temperature and humidity data logger described in Section VIII.C.IV.C. (with the costs accounted for there) to meet this requirement. Since employers would purchase data loggers that can automatically record the heat index measurements in and around a work site, OSHA assumes employers would incur no additional cost to comply with this recordkeeping requirement.

V. Estimated Total Costs of Compliance.

This section summarizes the estimated total costs of compliance with the proposed standard. The total costs are generally calculated by multiplying the basis for each cost (the number of affected establishments or affected employees as shown in Section VIII.B. Profile of Affected Industries) by the unit costs shown in Section VIII.C.IV. Each of these costs are then multiplied by their corresponding non-compliance rates (as shown in Section VIII.C.II.A.) to determine total compliance-adjusted costs.

Many costs in this analysis are incurred one time, and most others are either annual or can be annualized based on days of exposure or events that happen multiple times per year. For the purposes of this cost analysis, total costs are annualized based on several assumptions, such as estimates of the number of hours at or above both heat triggers and incidence rates for HRIs and heat-related fatalities (see Section VIII.C.II., Cost Assumptions for additional detail). The exceptions are the identification and evaluation of heat-exposed work areas for indoor work sites and the corresponding employee involvement in that work area evaluation, which are assumed to impact 20 percent of establishments each year. Based on that assumption, OSHA estimates that these costs are both incurred every five years. In order to present compliance costs and benefits estimates on a consistent basis across proposed standard provisions, they are presented as annualized costs.

For each provision described below, this analysis annualizes one-time costs using a 2 percent discount rate over a 10-year period. For the two costs incurred every five years, OSHA calculated the present value of these costs assuming that they would be incurred in the first year and the sixth year after adoption of the proposed standard using a 2 percent discount rate. Using the present value of these costs, OSHA then annualized using a 2 percent discount rate. Annualized one-time and annual costs, plus the annualized period costs, are then summed to estimate total annualized costs.

For each provision in the proposed standard, OSHA also calculated the estimated total annualized undiscounted costs, using the same method as above but assuming a 0 percent discount rate over a 10-year period.

A. Rule Familiarization.

All affected establishments would incur rule familiarization costs. To calculate the total cost of rule familiarization, OSHA multiplies the number of affected establishments from Table VIII.B.12. in Section VIII.B., by the unit costs presented in Table VIII.C.8. As all affected employers incur this cost, no compliance adjustment is necessary. Table VIII.C.21. shows the annualized one-time, annual, and total annualized costs for each of these requirements by industry category, discounted (2 percent over a 10-year period) and undiscounted.

Table VIII.C.21. Total Costs – Rule Familiarization (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Agriculture, Forestry, and Fishing	$527,603	$587,362	$0	$527,603	$587,362
Building Materials and Equipment Suppliers	$104,224	$116,029	$0	$104,224	$116,029
Commercial Kitchens	$846,038	$941,865	$0	$846,038	$941,865
Construction	$5,074,534	$5,649,302	$0	$5,074,534	$5,649,302
Drycleaning and Commercial Laundries	$83,921	$93,426	$0	$83,921	$93,426
Landscaping and Facilities Support	$342,744	$381,565	$0	$342,744	$381,565
Maintenance and Repair	$510,799	$568,655	$0	$510,799	$568,655
Manufacturing	$922,558	$1,027,052	$0	$922,558	$1,027,052
Oil and Gas	$180,543	$200,992	$0	$180,543	$200,992
Postal and Delivery Services	$227,857	$253,665	$0	$227,857	$253,665
Recreation and Amusement	$215,821	$240,265	$0	$215,821	$240,265
Sanitation and Waste Removal	$19,362	$21,555	$0	$19,362	$21,555
Telecommunications	$73,042	$81,316	$0	$73,042	$81,316
Temporary Help Services	$40,721	$45,333	$0	$40,721	$45,333
Transportation	$836,631	$931,392	$0	$836,631	$931,392
Utilities	$173,581	$193,241	$0	$173,581	$193,241
Warehousing	$86,490	$96,286	$0	$86,490	$96,286
Non-Core	$5,076,915	$5,651,954	$0	$5,076,915	$5,651,954
Total	**$15,343,382**	**$17,081,254**	**$0**	**$15,343,382**	**$17,081,254**

Source: OSHA estimate.

Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

B. Heat Injury and Illness Prevention Plan (HIIPP).

All affected establishments would incur costs for developing a HIIPP. For those establishments that already have a HIIPP, they are expected to review their HIIPP and make any modifications necessary to match the requirements outlined in this proposed standard. Section VIII.C.II.A. discusses the percentages of establishments with HIIPPs already in place in certain industries and states.

The proposed standard does not require establishments with ten or less employees to develop their HIIPP in writing. For the purpose of this analysis, OSHA assumed that all affected establishments with ten or less employees would choose to use OSHA's template to guide their development of an unwritten HIIPP. Of the remaining establishments that do not have an existing HIIPP and have more than ten employees, OSHA assumes that, as discussed in Section VIII.C.IV.B., 90 percent of these establishments without an existing plan would choose the less burdensome option of using OSHA's template, while the other 10 percent would write their HIIPP from scratch.[80]

Affected establishments would have to review and update their HIIPPs annually. The time to perform this requirement (one hour) does not depend on the option that establishments choose when initially developing their HIIPP.

The proposed standard would also require that non-managerial employees be involved in the development, review, and update of the HIIPP. As discussed in Section VIII.C.IV.B., OSHA assumed that four employees per establishment would spend one hour providing input on the development of the HIIPP and 20 minutes on the review and update of their establishments' HIIPP. These time estimates are assumed to be the same regardless of the option that the establishment chooses when developing, reviewing, and updating their HIIPP. Table VIII.C.22. shows the annualized one-time, annual, and total

[80] The percentage of establishments overall that will choose to write a HIIPP from scratch as reported in Section VIII.C.IV.B. is estimated using these assumptions. The percentage of establishments choosing to write the HIIPP from scratch is equal to the estimated percentage of establishments without an existing HIIPP (50 percent) multiplied by the percentage of establishments without a HIIPP that will write from scratch (10 percent), resulting in an estimate of 5 percent.

annualized costs for each of these requirements by industry category, discounted (2 percent over a 10-year period) and undiscounted.

Table VIII.C.22. Total Costs – Heat Injury and Illness Prevention Plan (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Write HIIPP from Scratch					
Agriculture, Forestry, and Fishing	$571,516	$636,249	$0	$571,516	$636,249
Building Materials and Equipment Suppliers	$79,076	$88,032	$0	$79,076	$88,032
Commercial Kitchens	$687,870	$765,782	$0	$687,870	$765,782
Construction	$736,175	$819,558	$0	$736,175	$819,558
Drycleaning and Commercial Laundries	$34,901	$38,854	$0	$34,901	$38,854
Landscaping and Facilities Support	$147,130	$163,795	$0	$147,130	$163,795
Maintenance and Repair	$149,423	$166,347	$0	$149,423	$166,347
Manufacturing	$316,372	$352,206	$0	$316,372	$352,206
Oil and Gas	$123,156	$137,105	$0	$123,156	$137,105
Postal and Delivery Services	$287,792	$320,388	$0	$287,792	$320,388
Recreation and Amusement	$123,726	$137,740	$0	$123,726	$137,740
Sanitation and Waste Removal	$13,733	$15,288	$0	$13,733	$15,288
Telecommunications	$90,704	$100,978	$0	$90,704	$100,978
Temporary Help Services	$41,207	$45,874	$0	$41,207	$45,874
Transportation	$336,424	$374,530	$0	$336,424	$374,530
Utilities	$196,764	$219,050	$0	$196,764	$219,050
Warehousing	$99,757	$111,055	$0	$99,757	$111,055
Non-Core	$4,758,864	$5,297,878	$0	$4,758,864	$5,297,878
Subtotal	**$8,794,588**	**$9,790,710**	**$0**	**$8,794,588**	**$9,790,710**
Review and Modify HIIPP – Existing Plan in Place					
Agriculture, Forestry, and Fishing	$602,197	$670,405	$0	$602,197	$670,405
Building Materials and Equipment Suppliers	$71,235	$79,303	$0	$71,235	$79,303

Table VIII.C.22. Total Costs – Heat Injury and Illness Prevention Plan (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Commercial Kitchens	$640,861	$713,448	$0	$640,861	$713,448
Construction	$1,869,454	$2,081,199	$0	$1,869,454	$2,081,199
Drycleaning and Commercial Laundries	$30,363	$33,802	$0	$30,363	$33,802
Landscaping and Facilities Support	$127,030	$141,418	$0	$127,030	$141,418
Maintenance and Repair	$134,784	$150,051	$0	$134,784	$150,051
Manufacturing	$862,318	$959,989	$0	$862,318	$959,989
Oil and Gas	$104,531	$116,371	$0	$104,531	$116,371
Postal and Delivery Services	$256,231	$285,253	$0	$256,231	$285,253
Recreation and Amusement	$111,630	$124,274	$0	$111,630	$124,274
Sanitation and Waste Removal	$12,418	$13,825	$0	$12,418	$13,825
Telecommunications	$81,702	$90,956	$0	$81,702	$90,956
Temporary Help Services	$36,857	$41,032	$0	$36,857	$41,032
Transportation	$348,769	$388,272	$0	$348,769	$388,272
Utilities	$172,636	$192,190	$0	$172,636	$192,190
Warehousing	$89,576	$99,722	$0	$89,576	$99,722
Non-Core	$645,831	$718,981	$0	$645,831	$718,981
Subtotal	**$6,198,424**	**$6,900,490**	**$0**	**$6,198,424**	**$6,900,490**
Use HIIPP Template					
Agriculture, Forestry, and Fishing	$1,028,729	$1,145,248	$0	$1,028,729	$1,145,248
Building Materials and Equipment Suppliers	$142,336	$158,458	$0	$142,336	$158,458
Commercial Kitchens	$1,238,166	$1,378,407	$0	$1,238,166	$1,378,407
Construction	$1,325,114	$1,475,204	$0	$1,325,114	$1,475,204
Drycleaning and Commercial Laundries	$62,822	$69,938	$0	$62,822	$69,938
Landscaping and Facilities Support	$264,834	$294,830	$0	$264,834	$294,830
Maintenance and Repair	$268,961	$299,425	$0	$268,961	$299,425

Table VIII.C.22. Total Costs – Heat Injury and Illness Prevention Plan (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Manufacturing	$569,469	$633,971	$0	$569,469	$633,971
Oil and Gas	$221,681	$246,789	$0	$221,681	$246,789
Postal and Delivery Services	$518,025	$576,699	$0	$518,025	$576,699
Recreation and Amusement	$222,707	$247,932	$0	$222,707	$247,932
Sanitation and Waste Removal	$24,719	$27,519	$0	$24,719	$27,519
Telecommunications	$163,268	$181,761	$0	$163,268	$181,761
Temporary Help Services	$74,172	$82,574	$0	$74,172	$82,574
Transportation	$605,564	$674,153	$0	$605,564	$674,153
Utilities	$354,175	$394,291	$0	$354,175	$394,291
Warehousing	$179,562	$199,900	$0	$179,562	$199,900
Non-Core	$8,565,954	$9,536,180	$0	$8,565,954	$9,536,180
Subtotal	**$15,830,259**	**$17,623,278**	**$0**	**$15,830,259**	**$17,623,278**
No Written HIIPP					
Agriculture, Forestry, and Fishing	$384,875	$428,468	$0	$384,875	$428,468
Building Materials and Equipment Suppliers	$197,485	$219,853	$0	$197,485	$219,853
Commercial Kitchens	$1,441,614	$1,604,899	$0	$1,441,614	$1,604,899
Construction	$16,325,441	$18,174,547	$0	$16,325,441	$18,174,547
Drycleaning and Commercial Laundries	$240,566	$267,814	$0	$240,566	$267,814
Landscaping and Facilities Support	$971,555	$1,081,599	$0	$971,555	$1,081,599
Maintenance and Repair	$1,628,310	$1,812,741	$0	$1,628,310	$1,812,741
Manufacturing	$1,888,694	$2,102,618	$0	$1,888,694	$2,102,618
Oil and Gas	$390,715	$434,970	$0	$390,715	$434,970
Postal and Delivery Services	$117,737	$131,073	$0	$117,737	$131,073
Recreation and Amusement	$519,705	$578,570	$0	$519,705	$578,570
Sanitation and Waste Removal	$39,269	$43,717	$0	$39,269	$43,717
Telecommunications	$40,508	$45,096	$0	$40,508	$45,096

Table VIII.C.22. Total Costs – Heat Injury and Illness Prevention Plan (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Temporary Help Services	$48,969	$54,515	$0	$48,969	$54,515
Transportation	$2,339,927	$2,604,960	$0	$2,339,927	$2,604,960
Utilities	$155,752	$173,394	$0	$155,752	$173,394
Warehousing	$69,627	$77,514	$0	$69,627	$77,514
Non-Core	$12,929,181	$14,393,608	$0	$12,929,181	$14,393,608
Subtotal	**$39,729,931**	**$44,229,952**	**$0**	**$39,729,931**	**$44,229,952**
HIIPP Development Involvement – Employee					
Agriculture, Forestry, and Fishing	$851,195	$947,606	$0	$851,195	$947,606
Building Materials and Equipment Suppliers	$192,469	$214,269	$0	$192,469	$214,269
Commercial Kitchens	$1,817,682	$2,023,562	$0	$1,817,682	$2,023,562
Construction	$9,833,544	$10,947,344	$0	$9,833,544	$10,947,344
Drycleaning and Commercial Laundries	$158,699	$176,674	$0	$158,699	$176,674
Landscaping and Facilities Support	$576,337	$641,616	$0	$576,337	$641,616
Maintenance and Repair	$965,955	$1,075,364	$0	$965,955	$1,075,364
Manufacturing	$1,450,926	$1,615,265	$0	$1,450,926	$1,615,265
Oil and Gas	$304,839	$339,367	$0	$304,839	$339,367
Postal and Delivery Services	$375,365	$417,881	$0	$375,365	$417,881
Recreation and Amusement	$354,289	$394,418	$0	$354,289	$394,418
Sanitation and Waste Removal	$28,608	$31,849	$0	$28,608	$31,849
Telecommunications	$142,022	$158,108	$0	$142,022	$158,108
Temporary Help Services	$60,166	$66,981	$0	$60,166	$66,981
Transportation	$1,378,241	$1,534,347	$0	$1,378,241	$1,534,347
Utilities	$418,672	$466,093	$0	$418,672	$466,093
Warehousing	$142,480	$158,618	$0	$142,480	$158,618
Non-Core	$10,068,354	$11,208,749	$0	$10,068,354	$11,208,749
Subtotal	**$29,119,844**	**$32,418,111**	**$0**	**$29,119,844**	**$32,418,111**

Table VIII.C.22. Total Costs – Heat Injury and Illness Prevention Plan (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Review and Update HIIPP					
Agriculture, Forestry, and Fishing	$0	$0	$2,638,013	$2,638,013	$2,638,013
Building Materials and Equipment Suppliers	$0	$0	$521,118	$521,118	$521,118
Commercial Kitchens	$0	$0	$4,230,189	$4,230,189	$4,230,189
Construction	$0	$0	$25,372,668	$25,372,668	$25,372,668
Drycleaning and Commercial Laundries	$0	$0	$419,603	$419,603	$419,603
Landscaping and Facilities Support	$0	$0	$1,713,720	$1,713,720	$1,713,720
Maintenance and Repair	$0	$0	$2,553,994	$2,553,994	$2,553,994
Manufacturing	$0	$0	$4,612,791	$4,612,791	$4,612,791
Oil and Gas	$0	$0	$902,716	$902,716	$902,716
Postal and Delivery Services	$0	$0	$1,139,285	$1,139,285	$1,139,285
Recreation and Amusement	$0	$0	$1,079,103	$1,079,103	$1,079,103
Sanitation and Waste Removal	$0	$0	$96,811	$96,811	$96,811
Telecommunications	$0	$0	$365,212	$365,212	$365,212
Temporary Help Services	$0	$0	$203,603	$203,603	$203,603
Transportation	$0	$0	$4,183,154	$4,183,154	$4,183,154
Utilities	$0	$0	$867,903	$867,903	$867,903
Warehousing	$0	$0	$432,448	$432,448	$432,448
Non-Core	$0	$0	$25,384,577	$25,384,577	$25,384,577
Subtotal	$0	**$0**	**$76,716,909**	**$76,716,909**	**$76,716,909**
HIIPP Review and Update Involvement – Employee					
Agriculture, Forestry, and Fishing	$0	$0	$2,837,318	$2,837,318	$2,837,318
Building Materials and Equipment Suppliers	$0	$0	$641,563	$641,563	$641,563
Commercial Kitchens	$0	$0	$6,058,940	$6,058,940	$6,058,940
Construction	$0	$0	$32,778,482	$32,778,482	$32,778,482

Table VIII.C.22. Total Costs – Heat Injury and Illness Prevention Plan (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Drycleaning and Commercial Laundries	$0	$0	$528,998	$528,998	$528,998
Landscaping and Facilities Support	$0	$0	$1,921,123	$1,921,123	$1,921,123
Maintenance and Repair	$0	$0	$3,219,849	$3,219,849	$3,219,849
Manufacturing	$0	$0	$4,836,419	$4,836,419	$4,836,419
Oil and Gas	$0	$0	$1,016,130	$1,016,130	$1,016,130
Postal and Delivery Services	$0	$0	$1,251,217	$1,251,217	$1,251,217
Recreation and Amusement	$0	$0	$1,180,963	$1,180,963	$1,180,963
Sanitation and Waste Removal	$0	$0	$95,362	$95,362	$95,362
Telecommunications	$0	$0	$473,407	$473,407	$473,407
Temporary Help Services	$0	$0	$200,554	$200,554	$200,554
Transportation	$0	$0	$4,594,136	$4,594,136	$4,594,136
Utilities	$0	$0	$1,395,573	$1,395,573	$1,395,573
Warehousing	$0	$0	$474,934	$474,934	$474,934
Non-Core	$0	$0	$33,561,180	$33,561,180	$33,561,180
Subtotal	**$0**	**$0**	**$97,066,147**	**$97,066,147**	**$97,066,147**
Total					
Agriculture, Forestry, and Fishing	$3,438,511	$3,827,975	$5,475,331	$8,913,842	$9,303,306
Building Materials and Equipment Suppliers	$682,600	$759,915	$1,162,682	$1,845,282	$1,922,597
Commercial Kitchens	$5,826,193	$6,486,098	$10,289,129	$16,115,322	$16,775,228
Construction	$30,089,729	$33,497,850	$58,151,149	$88,240,878	$91,649,000
Drycleaning and Commercial Laundries	$527,352	$587,083	$948,600	$1,475,952	$1,535,683
Landscaping and Facilities Support	$2,086,886	$2,323,258	$3,634,843	$5,721,729	$5,958,101
Maintenance and Repair	$3,147,433	$3,503,928	$5,773,844	$8,921,277	$9,277,772
Manufacturing	$5,087,780	$5,664,048	$9,449,210	$14,536,989	$15,113,258
Oil and Gas	$1,144,922	$1,274,601	$1,918,846	$3,063,767	$3,193,447

Table VIII.C.22. Total Costs – Heat Injury and Illness Prevention Plan (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Postal and Delivery Services	$1,555,149	$1,731,294	$2,390,502	$3,945,651	$4,121,796
Recreation and Amusement	$1,332,058	$1,482,934	$2,260,066	$3,592,124	$3,743,000
Sanitation and Waste Removal	$118,748	$132,198	$192,173	$310,921	$324,371
Telecommunications	$518,204	$576,898	$838,619	$1,356,823	$1,415,518
Temporary Help Services	$261,372	$290,976	$404,158	$665,530	$695,134
Transportation	$5,008,925	$5,576,262	$8,777,289	$13,786,214	$14,353,551
Utilities	$1,297,999	$1,445,017	$2,263,476	$3,561,475	$3,708,493
Warehousing	$581,002	$646,809	$907,382	$1,488,384	$1,554,191
Non-Core	$36,968,184	$41,155,395	$58,945,757	$95,913,940	$100,101,152
Total	**$99,673,046**	**$110,962,542**	**$173,783,056**	**$273,456,102**	**$284,745,597**

Source: OSHA estimate.

Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

C. Identifying Heat Hazards.

Establishments would be expected to monitor environmental conditions in and around work areas under the proposed standard for both indoor and outdoor work sites. As outlined in Section VIII.C.IV.C., establishments with outdoor work sites could track local forecasts to meet this requirement, while establishments with indoor work sites are assumed to use temperature and data loggers to monitor environmental conditions. For this analysis, OSHA assumes one work area per establishment. OSHA estimates the number of establishments with outdoor and indoor work areas by estimating the percentage of employees in each industry that are estimated as indoor and outdoor employees affected by the proposed standard. OSHA multiplies the total number of affected establishments by the percentages of indoor and outdoor employees to determine the number of indoor and outdoor establishments and then multiplies these counts of indoor and outdoor establishments by their respective unit costs for indoor and outdoor environmental monitoring (with the unit costs for outdoor establishments being lower than for indoor establishments).

Indoor establishments would also need to identify work areas that pose heat-related risks to employees. OSHA assumes that 20 percent of establishments will need to reevaluate work areas due to changes to work processes that may result in increased heat-related exposure for employees every year. OSHA therefore has estimated that this indoor work area evaluation would be incurred every five years at each establishment. Similar to the development and review of the HIIPP, the proposed standard would require employee involvement in these work-area evaluations. OSHA again assumes that four employees per establishment would make up a representative sample of employees that could provide input. Since these work-area evaluations are expected to occur every five years, OSHA assumed that the cost for these work-area evaluations would occur in the first and sixth years after the proposed standard's implementation. OSHA determined the present value of these costs using a 2 percent discount rate. Once adjusted for compliance, OSHA annualized the present value of these costs for inclusion in the total annualized costs for this provision.

Table VIII.C.23. shows the annualized costs for each of these requirements by industry category, discounted (2 percent over a 10-year period) and undiscounted.

Table VIII.C.23. Total Costs – Identifying Heat Hazards (2023$)

Industry Category	One-Time Annualized		Periodic Costs Annualized		Annual	Total Annualized	
	0%	2%	0%	2%		0%	2%
Outdoor Environmental Monitoring							
Agriculture, Forestry, and Fishing	$0	$0	$0	$0	$1,375,617	$1,375,617	$1,375,617
Building Materials and Equipment Suppliers	$0	$0	$0	$0	$158,176	$158,176	$158,176
Commercial Kitchens	$0	$0	$0	$0	$281,211	$281,211	$281,211
Construction	$0	$0	$0	$0	$10,052,936	$10,052,936	$10,052,936
Drycleaning and Commercial Laundries	$0	$0	$0	$0	$80,978	$80,978	$80,978
Landscaping and Facilities Support	$0	$0	$0	$0	$1,064,766	$1,064,766	$1,064,766
Maintenance and Repair	$0	$0	$0	$0	$899,249	$899,249	$899,249
Manufacturing	$0	$0	$0	$0	$531,117	$531,117	$531,117
Oil and Gas	$0	$0	$0	$0	$496,105	$496,105	$496,105
Postal and Delivery Services	$0	$0	$0	$0	$437,122	$437,122	$437,122
Recreation and Amusement	$0	$0	$0	$0	$485,898	$485,898	$485,898
Sanitation and Waste Removal	$0	$0	$0	$0	$40,070	$40,070	$40,070
Telecommunications	$0	$0	$0	$0	$156,702	$156,702	$156,702
Temporary Help Services	$0	$0	$0	$0	$53,412	$53,412	$53,412
Transportation	$0	$0	$0	$0	$1,701,945	$1,701,945	$1,701,945
Utilities	$0	$0	$0	$0	$404,225	$404,225	$404,225
Warehousing	$0	$0	$0	$0	$99,663	$99,663	$99,663
Non-Core	$0	$0	$0	$0	$8,653,930	$8,653,930	$8,653,930
Subtotal	$0	**$0**	$0	**$0**	**$26,973,121**	**$26,973,121**	**$26,973,121**
Indoor Environmental Monitoring							
Agriculture, Forestry, and Fishing	$0	$0	$0	$0	$5,185,108	$5,185,108	$5,185,108
Building Materials and Equipment Suppliers	$0	$0	$0	$0	$2,683,488	$2,683,488	$2,683,488
Commercial Kitchens	$0	$0	$0	$0	$30,781,175	$30,781,175	$30,781,175
Construction	$0	$0	$0	$0	$22,515,231	$22,515,231	$22,515,231
Drycleaning and Commercial Laundries	$0	$0	$0	$0	$2,699,251	$2,699,251	$2,699,251
Landscaping and Facilities Support	$0	$0	$0	$0	$4,713,180	$4,713,180	$4,713,180

Table VIII.C.23. Total Costs – Identifying Heat Hazards (2023$)

Industry Category	One-Time Annualized		Periodic Costs Annualized		Annual	Total Annualized	
	0%	2%	0%	2%		0%	2%
Maintenance and Repair	$0	$0	$0	$0	$11,923,927	$11,923,927	$11,923,927
Manufacturing	$0	$0	$0	$0	$10,319,923	$10,319,923	$10,319,923
Oil and Gas	$0	$0	$0	$0	$2,870,853	$2,870,853	$2,870,853
Postal and Delivery Services	$0	$0	$0	$0	$4,943,180	$4,943,180	$4,943,180
Recreation and Amusement	$0	$0	$0	$0	$3,895,764	$3,895,764	$3,895,764
Sanitation and Waste Removal	$0	$0	$0	$0	$386,155	$386,155	$386,155
Telecommunications	$0	$0	$0	$0	$1,423,714	$1,423,714	$1,423,714
Temporary Help Services	$0	$0	$0	$0	$1,134,702	$1,134,702	$1,134,702
Transportation	$0	$0	$0	$0	$14,040,680	$14,040,680	$14,040,680
Utilities	$0	$0	$0	$0	$3,101,788	$3,101,788	$3,101,788
Warehousing	$0	$0	$0	$0	$2,565,146	$2,565,146	$2,565,146
Non-Core	$0	$0	$0	$0	$215,676,858	$215,676,858	$215,676,858
Subtotal	**$0**	**$0**	**$0**	**$0**	**$340,860,123**	**$340,860,123**	**$340,860,123**
Indoor Identification of Heat-Exposed Work Areas							
Agriculture, Forestry, and Fishing	$0	$0	$434,176	$451,540	$0	$434,176	$451,540
Building Materials and Equipment Suppliers	$0	$0	$196,825	$204,696	$0	$196,825	$204,696
Commercial Kitchens	$0	$0	$2,237,077	$2,326,542	$0	$2,237,077	$2,326,542
Construction	$0	$0	$969,517	$1,008,290	$0	$969,517	$1,008,290
Drycleaning and Commercial Laundries	$0	$0	$193,662	$201,407	$0	$193,662	$201,407
Landscaping and Facilities Support	$0	$0	$339,167	$352,731	$0	$339,167	$352,731
Maintenance and Repair	$0	$0	$873,563	$908,498	$0	$873,563	$908,498
Manufacturing	$0	$0	$352,835	$366,946	$0	$352,835	$366,946
Oil and Gas	$0	$0	$201,310	$209,361	$0	$201,310	$209,361
Postal and Delivery Services	$0	$0	$362,718	$377,224	$0	$362,718	$377,224
Recreation and Amusement	$0	$0	$288,093	$299,614	$0	$288,093	$299,614
Sanitation and Waste Removal	$0	$0	$28,493	$29,633	$0	$28,493	$29,633
Telecommunications	$0	$0	$104,314	$108,485	$0	$104,314	$108,485

Table VIII.C.23. Total Costs – Identifying Heat Hazards (2023$)

Industry Category	One-Time Annualized		Periodic Costs Annualized		Annual	Total Annualized	
	0%	2%	0%	2%		0%	2%
Temporary Help Services	$0	$0	$83,063	$86,385	$0	$83,063	$86,385
Transportation	$0	$0	$1,134,479	$1,179,850	$0	$1,134,479	$1,179,850
Utilities	$0	$0	$167,121	$173,804	$0	$167,121	$173,804
Warehousing	$0	$0	$186,866	$194,339	$0	$186,866	$194,339
Non-Core	$0	$0	$15,801,702	$16,433,646	$0	$15,801,702	$16,433,646
Subtotal	**$0**	**$0**	**$23,954,982**	**$24,912,993**	**$0**	**$23,954,982**	**$24,912,993**
Work Area Evaluation – Employee							
Agriculture, Forestry, and Fishing	$0	$0	$116,745	$121,414	$0	$116,745	$121,414
Building Materials and Equipment Suppliers	$0	$0	$60,542	$62,963	$0	$60,542	$62,963
Commercial Kitchens	$0	$0	$834,492	$867,865	$0	$834,492	$867,865
Construction	$0	$0	$1,674,440	$1,741,404	$0	$1,674,440	$1,741,404
Drycleaning and Commercial Laundries	$0	$0	$61,038	$63,479	$0	$61,038	$63,479
Landscaping and Facilities Support	$0	$0	$95,514	$99,334	$0	$95,514	$99,334
Maintenance and Repair	$0	$0	$275,328	$286,338	$0	$275,328	$286,338
Manufacturing	$0	$0	$601,334	$625,383	$0	$601,334	$625,383
Oil and Gas	$0	$0	$56,627	$58,892	$0	$56,627	$58,892
Postal and Delivery Services	$0	$0	$99,588	$103,571	$0	$99,588	$103,571
Recreation and Amusement	$0	$0	$78,775	$81,925	$0	$78,775	$81,925
Sanitation and Waste Removal	$0	$0	$7,017	$7,297	$0	$7,017	$7,297
Telecommunications	$0	$0	$33,804	$35,156	$0	$33,804	$35,156
Temporary Help Services	$0	$0	$20,455	$21,273	$0	$20,455	$21,273
Transportation	$0	$0	$311,485	$323,942	$0	$311,485	$323,942
Utilities	$0	$0	$90,893	$94,528	$0	$90,893	$94,528
Warehousing	$0	$0	$51,306	$53,358	$0	$51,306	$53,358
Non-Core	$0	$0	$2,926,926	$3,043,980	$0	$2,926,926	$3,043,980
Subtotal	**$0**	**$0**	**$7,396,309**	**$7,692,103**	**$0**	**$7,396,309**	**$7,692,103**
Monitoring Equipment – Indoor							

Table VIII.C.23. Total Costs – Identifying Heat Hazards (2023$)

Industry Category	One-Time Annualized		Periodic Costs Annualized		Annual	Total Annualized	
	0%	2%	0%	2%		0%	2%
Agriculture, Forestry, and Fishing	$118,862	$132,325	$0	$0	$0	$118,862	$132,325
Building Materials and Equipment Suppliers	$57,453	$63,961	$0	$0	$0	$57,453	$63,961
Commercial Kitchens	$1,048,813	$1,167,608	$0	$0	$0	$1,048,813	$1,167,608
Construction	$362,081	$403,092	$0	$0	$0	$362,081	$403,092
Drycleaning and Commercial Laundries	$56,623	$63,037	$0	$0	$0	$56,623	$63,037
Landscaping and Facilities Support	$97,542	$108,590	$0	$0	$0	$97,542	$108,590
Maintenance and Repair	$250,133	$278,465	$0	$0	$0	$250,133	$278,465
Manufacturing	$168,477	$187,560	$0	$0	$0	$168,477	$187,560
Oil and Gas	$41,489	$46,189	$0	$0	$0	$41,489	$46,189
Postal and Delivery Services	$93,192	$103,747	$0	$0	$0	$93,192	$103,747
Recreation and Amusement	$96,716	$107,670	$0	$0	$0	$96,716	$107,670
Sanitation and Waste Removal	$7,882	$8,774	$0	$0	$0	$7,882	$8,774
Telecommunications	$18,319	$20,394	$0	$0	$0	$18,319	$20,394
Temporary Help Services	$23,160	$25,783	$0	$0	$0	$23,160	$25,783
Transportation	$264,703	$294,685	$0	$0	$0	$264,703	$294,685
Utilities	$37,716	$41,988	$0	$0	$0	$37,716	$41,988
Warehousing	$48,360	$53,837	$0	$0	$0	$48,360	$53,837
Non-Core	$4,048,215	$4,506,737	$0	$0	$0	$4,048,215	$4,506,737
Subtotal	**$6,839,737**	**$7,614,442**	**$0**	**$0**	**$0**	**$6,839,737**	**$7,614,442**
Review Monitoring Equipment User Manual – Indoor							
Agriculture, Forestry, and Fishing	$5,992	$6,671	$0	$0	$0	$5,992	$6,671
Building Materials and Equipment Suppliers	$3,096	$3,447	$0	$0	$0	$3,096	$3,447
Commercial Kitchens	$36,379	$40,499	$0	$0	$0	$36,379	$40,499
Construction	$60,102	$66,909	$0	$0	$0	$60,102	$66,909
Drycleaning and Commercial Laundries	$3,115	$3,467	$0	$0	$0	$3,115	$3,467
Landscaping and Facilities Support	$5,921	$6,592	$0	$0	$0	$5,921	$6,592
Maintenance and Repair	$13,758	$15,317	$0	$0	$0	$13,758	$15,317

Table VIII.C.23. Total Costs – Identifying Heat Hazards (2023$)

Industry Category	One-Time Annualized		Periodic Costs Annualized		Annual	Total Annualized	
	0%	2%	0%	2%		0%	2%
Manufacturing	$29,769	$33,141	$0	$0	$0	$29,769	$33,141
Oil and Gas	$3,383	$3,766	$0	$0	$0	$3,383	$3,766
Postal and Delivery Services	$5,704	$6,350	$0	$0	$0	$5,704	$6,350
Recreation and Amusement	$4,495	$5,004	$0	$0	$0	$4,495	$5,004
Sanitation and Waste Removal	$446	$496	$0	$0	$0	$446	$496
Telecommunications	$1,643	$1,829	$0	$0	$0	$1,643	$1,829
Temporary Help Services	$1,309	$1,458	$0	$0	$0	$1,309	$1,458
Transportation	$16,201	$18,036	$0	$0	$0	$16,201	$18,036
Utilities	$3,579	$3,984	$0	$0	$0	$3,579	$3,984
Warehousing	$2,960	$3,295	$0	$0	$0	$2,960	$3,295
Non-Core	$139,235	$155,005	$0	$0	$0	$139,235	$155,005
Subtotal	**$337,086**	**$375,266**	**$0**	**$0**	**$0**	**$337,086**	**$375,266**
Total							
Agriculture, Forestry, and Fishing	$124,854	$138,996	$550,921	$572,954	$6,560,724	$7,236,500	$7,272,674
Building Materials and Equipment Suppliers	$60,550	$67,408	$257,367	$267,659	$2,841,664	$3,159,581	$3,176,732
Commercial Kitchens	$1,085,192	$1,208,107	$3,071,569	$3,194,407	$31,062,385	$35,219,146	$35,464,900
Construction	$422,183	$470,002	$2,643,957	$2,749,695	$32,568,167	$35,634,308	$35,787,864
Drycleaning and Commercial Laundries	$59,738	$66,504	$254,700	$264,886	$2,780,229	$3,094,667	$3,111,620
Landscaping and Facilities Support	$103,463	$115,182	$434,682	$452,065	$5,777,946	$6,316,091	$6,345,193
Maintenance and Repair	$263,892	$293,782	$1,148,890	$1,194,837	$12,823,176	$14,235,958	$14,311,794
Manufacturing	$198,246	$220,701	$954,170	$992,329	$10,851,040	$12,003,456	$12,064,070
Oil and Gas	$44,873	$49,955	$257,938	$268,253	$3,366,958	$3,669,768	$3,685,166
Postal and Delivery Services	$98,895	$110,097	$462,306	$480,795	$5,380,302	$5,941,504	$5,971,194
Recreation and Amusement	$101,211	$112,674	$366,868	$381,540	$4,381,662	$4,849,741	$4,875,876
Sanitation and Waste Removal	$8,327	$9,270	$35,510	$36,930	$426,225	$470,062	$472,425
Telecommunications	$19,962	$22,223	$138,118	$143,641	$1,580,416	$1,738,495	$1,746,280
Temporary Help Services	$24,469	$27,241	$103,518	$107,658	$1,188,114	$1,316,102	$1,323,013

Table VIII.C.23. Total Costs – Identifying Heat Hazards (2023$)

Industry Category	One-Time Annualized		Periodic Costs Annualized		Annual	Total Annualized	
	0%	2%	0%	2%		0%	2%
Transportation	$280,904	$312,721	$1,445,964	$1,503,791	$15,742,625	$17,469,493	$17,559,137
Utilities	$41,295	$45,972	$258,014	$268,332	$3,506,013	$3,805,322	$3,820,318
Warehousing	$51,319	$57,132	$238,172	$247,697	$2,664,809	$2,954,301	$2,969,638
Non-Core	$4,187,450	$4,661,742	$18,728,628	$19,477,626	$224,330,788	$247,246,865	$248,470,156
Total	**$7,176,823**	**$7,989,707**	**$31,351,291**	**$32,605,096**	**$367,833,244**	**$406,361,358**	**$408,428,047**

Source: OSHA estimate.

Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

D. Requirements at or Above the Initial Heat Trigger.

I. Drinking Water.

All affected establishments would be required to provide sufficiently cool water to their affected employees. In order to meet this requirement, OSHA assumes that establishments would purchase one 40-quart cooler for every 40 employees. These establishments would also purchase reusable water bottles for each affected employee.

II. Break Area(s) at Outdoor Work Sites.

All affected establishments would also have to provide break areas for affected employees. At establishments with outdoor work sites, OSHA assumes that each establishment would purchase a twelve-by-twelve-foot tent as a means of providing artificial shade. OSHA assumes that establishments would incur this cost one time.

III. Break Area(s) and Work Area(s) at Indoor Work Sites.

Establishments with indoor work sites would purchase one industrial pedestal fan and one dehumidifier that provide sufficient air movement and humidity control in break areas for every 10 employees. Establishments with indoor work sites would also have to purchase these same control measures for work areas for every 10 employees. However, OSHA does not capture a cost for dehumidifiers for establishments with indoor work sites in the four least humid states in the U.S. (Arizona, Nevada, New Mexico, and Utah).

IV. Acclimatization.

Both new and returning employees would undergo acclimatization during their first week of work when the initial heat trigger is met or exceeded during that first week. To calculate acclimatization costs, OSHA multiplied the unit costs for acclimatization shown in Section VIII.C.IV.D.IV., by the number of new employees and by the number of returning employees. OSHA calculates the number of new employees using BLS' Job Openings and Labor Turnover Survey (JOLTS) (BLS JOLTS, 2024). OSHA used the JOLTS hire rates from June through August for 2023 by sector to represent the percentage of employees that are new and join their respective employers when the initial heat trigger is met or exceeded. OSHA lacks data that would allow further refinement of this estimate. Calculating the number of new employees based on those hired in June through August may not accurately represent the universe of employees who will need acclimatization. This assumption may underestimate the number of newly hired employees in areas where the heat season is longer but might overestimate the number in areas where the weather is cooler for more of the year. OSHA also heard from Small Entity Representatives during the SBAR Panel process that they purposefully avoid hiring new employees during times when temperatures are high in order to avoid the difficulties and costs of acclimatization. Therefore, again, using the JOLTS data for this timeframe may overstate the number of employees who will need acclimatization. OSHA also applies this assumption to employees working indoors in settings without adequate climate control but, as discussed above in Section VIII.C.II.C., acknowledges that this assumption that outdoor heat translates to indoor heat may over- or understate the temperatures indoors. The agency welcomes comment on this estimate as well as data that would allow this parameter to be better estimated.

To calculate the number of returning employees, OSHA assumed that two percent of all employees not newly hired would qualify as returning employees (i.e., those returning to work from an absence of more than 14 days during a time when the initial or high heat trigger are met). OSHA welcomes comment on this estimate and information or data sources that might better allow the agency to identify employees returning from absences of more than 14 days. Next, OSHA multiplied the two percent by one minus the annual hire rate according to the JOLTS data by sector. OSHA then multiplied this product by the ratio of the summer hire rate to annual hire rate to arrive at the percentage of employees returning to work when the initial heat trigger is met or exceeded during their first week back.

V. Rest Breaks if Needed.

To calculate the cost for if-needed rest breaks when the initial heat trigger is met or exceeded, OSHA first calculated the number of rest breaks that affected employees would be expected to take annually. OSHA used the number of work hours in a given state for each work shift type (daytime, evening, and overnight) that met or exceeded the initial heat trigger but did not meet or exceed the high heat trigger. The estimated number of hours was then normalized to 8-hour work shift equivalents by dividing the number of hours meeting or exceeding the initial heat trigger (but not meeting the high heat trigger) by eight.[81] OSHA then multiplied these 8-hour work shift equivalents, the number of affected employees, and the corresponding unit costs for rest breaks for indoor and

[81] By assuming full, 8-hour work shifts at or above the heat trigger(s), this methodology may overstate the number of breaks employers need to provide since there may be some days where the heat triggers are met or exceeded but for shorter periods of time. For example, if the high heat trigger is met or exceeded for less than two hours, the requirement to provide a scheduled rest break would not be triggered. Additionally, employees exposed to heat at or above the initial heat trigger for shorter periods of time are likely to need fewer if-needed rest breaks. A scheduled lunch break in the middle of the day may also be sufficient to satisfy the break requirement on days when the high heat trigger is met for only a portion of the day. OSHA welcomes comment on this methodology and recommendations on alternative approaches.

outdoor employees as shown in Section VIII.C.IV.D.V. to determine total costs for rest breaks at the initial heat trigger.

As discussed in Section VIII.C.IV.D.V. and detailed further in Appendix A at the end of this section, OSHA estimates that under the proposed standard, the reduction in time spent on pacing (i.e., the increase in worker efficiency) will partially offset the added cost of time spent on if-needed rest breaks when the initial heat trigger is met or exceeded for employees in Group 1 (i.e., currently noncompliant with if-needed rest breaks as well as scheduled rest breaks), by 20 percent and 23.33 percent for outdoor and indoor employees, respectively. Combining this estimated partial offset of the unit cost of if-needed rest breaks as required by the proposed standard with data on the industry-level and/or state-level number of in-scope employees (discussed in Section VIII.B., Profile of Affected Industries), baseline non-compliance rates (discussed in Section VIII.C.II.A.), and state-level exposure to heat at or above the initial heat trigger (discussed in Section VIII.C.II.C.), OSHA estimates that approximately 21.78 percent of the total cost of compliance with if-needed rest breaks when the initial heat trigger is met or exceeded (approximately $0.0875 billion out of $0.402 billion) could be offset by avoided labor productivity losses due to pacing (i.e., avoided losses in worker efficiency).

VI. Effective Communication.

Employers would also be required to effectively communicate with affected employees when the initial heat trigger is met or exceeded. OSHA first calculated the number of times a designated person would have to perform this duty by estimating the number of hours annually that meet or exceed the initial heat trigger for each state.

OSHA then normalized these estimates to reflect 8-hour work shift equivalents. These 8-hour work shift equivalents are then multiplied by the number of affected employees and the unit costs as shown in Section VIII.C.IV.D.VI., Effective Communication, of 15 seconds every two hours of both a designated person's and at-risk employee's time.

Table VIII.C.24. shows the annualized one-time, annual, and total annualized costs for each of these requirements by industry category and region, discounted (2 percent over a 10-year period) and undiscounted.

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Coolers with Spigot						
Agriculture, Forestry, and Fishing						
Alaskan	$15	$16	$0	$0	$15	$16
Central	$1,822	$2,028	$0	$0	$1,822	$2,028
Eastern	$1,294	$1,441	$0	$0	$1,294	$1,441
Pacific	$13	$15	$0	$0	$13	$15
Southern	$1,941	$2,161	$0	$0	$1,941	$2,161
Western	$447	$498	$0	$0	$447	$498
Subtotal	**$5,532**	**$6,158**	**$0**	**$0**	**$5,532**	**$6,158**
Building Materials and Equipment Suppliers						
Alaskan	$23	$25	$0	$0	$23	$25
Central	$2,115	$2,355	$0	$0	$2,115	$2,355
Eastern	$2,627	$2,925	$0	$0	$2,627	$2,925
Pacific	$41	$45	$0	$0	$41	$45
Southern	$2,456	$2,734	$0	$0	$2,456	$2,734
Western	$1,497	$1,667	$0	$0	$1,497	$1,667
Subtotal	**$8,759**	**$9,751**	**$0**	**$0**	**$8,759**	**$9,751**
Commercial Kitchens						
Alaskan	$125	$140	$0	$0	$125	$140
Central	$14,789	$16,465	$0	$0	$14,789	$16,465
Eastern	$22,011	$24,504	$0	$0	$22,011	$24,504
Pacific	$476	$530	$0	$0	$476	$530
Southern	$19,755	$21,993	$0	$0	$19,755	$21,993
Western	$12,343	$13,741	$0	$0	$12,343	$13,741
Subtotal	$0	**$77,372**	**$0**	**$0**	**$69,500**	**$77,372**
Construction						
Alaskan	$235	$262	$0	$0	$235	$262
Central	$17,355	$19,321	$0	$0	$17,355	$19,321

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$25,296	$28,161	$0	$0	$25,296	$28,161
Pacific	$499	$556	$0	$0	$499	$556
Southern	$65,874	$73,335	$0	$0	$65,874	$73,335
Western	$18,599	$20,706	$0	$0	$18,599	$20,706
Subtotal	**$127,859**	**$142,341**	**$0**	**$0**	**$127,859**	**$142,341**
Drycleaning and Commercial Laundries						
Alaskan	$2	$3	$0	$0	$2	$3
Central	$277	$309	$0	$0	$277	$309
Eastern	$508	$566	$0	$0	$508	$566
Pacific	$11	$12	$0	$0	$11	$12
Southern	$401	$446	$0	$0	$401	$446
Western	$249	$277	$0	$0	$249	$277
Subtotal	**$1,448**	**$1,612**	**$0**	**$0**	**$1,448**	**$1,612**
Landscaping and Facilities Support						
Alaskan	$87	$96	$0	$0	$87	$96
Central	$5,475	$6,095	$0	$0	$5,475	$6,095
Eastern	$8,862	$9,865	$0	$0	$8,862	$9,865
Pacific	$171	$191	$0	$0	$171	$191
Southern	$7,341	$8,173	$0	$0	$7,341	$8,173
Western	$20,404	$22,716	$0	$0	$20,404	$22,716
Subtotal	**$42,340**	**$47,136**	**$0**	**$0**	**$42,340**	**$47,136**
Maintenance and Repair						
Alaskan	$26	$29	$0	$0	$26	$29
Central	$2,866	$3,190	$0	$0	$2,866	$3,190
Eastern	$3,702	$4,121	$0	$0	$3,702	$4,121
Pacific	$45	$50	$0	$0	$45	$50
Southern	$3,449	$3,839	$0	$0	$3,449	$3,839
Western	$2,148	$2,391	$0	$0	$2,148	$2,391

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$12,235**	**$13,621**	**$0**	**$0**	**$12,235**	**$13,621**
Manufacturing						
Alaskan	$70	$78	$0	$0	$70	$78
Central	$22,988	$25,592	$0	$0	$22,988	$25,592
Eastern	$21,278	$23,688	$0	$0	$21,278	$23,688
Pacific	$65	$72	$0	$0	$65	$72
Southern	$17,040	$18,970	$0	$0	$17,040	$18,970
Western	$11,035	$12,284	$0	$0	$11,035	$12,284
Subtotal	**$72,475**	**$80,684**	**$0**	**$0**	**$72,475**	**$80,684**
Oil and Gas						
Alaskan	$76	$85	$0	$0	$76	$85
Central	$554	$617	$0	$0	$554	$617
Eastern	$362	$403	$0	$0	$362	$403
Southern	$3,468	$3,861	$0	$0	$3,468	$3,861
Western	$725	$807	$0	$0	$725	$807
Subtotal	**$5,185**	**$5,772**	**$0**	**$0**	**$5,185**	**$5,772**
Postal and Delivery Services						
Alaskan	$5	$6	$0	$0	$5	$6
Central	$974	$1,084	$0	$0	$974	$1,084
Eastern	$1,556	$1,732	$0	$0	$1,556	$1,732
Pacific	$16	$17	$0	$0	$16	$17
Southern	$1,104	$1,229	$0	$0	$1,104	$1,229
Western	$776	$864	$0	$0	$776	$864
Subtotal	**$4,431**	**$4,933**	**$0**	**$0**	**$4,431**	**$4,933**
Recreation and Amusement						
Alaskan	$23	$26	$0	$0	$23	$26
Central	$2,358	$2,625	$0	$0	$2,358	$2,625
Eastern	$3,928	$4,373	$0	$0	$3,928	$4,373

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$51	$57	$0	$0	$51	$57
Southern	$3,076	$3,425	$0	$0	$3,076	$3,425
Western	$2,314	$2,576	$0	$0	$2,314	$2,576
Subtotal	**$11,750**	**$13,081**	**$0**	**$0**	**$11,750**	**$13,081**
Sanitation and Waste Removal						
Alaskan	$14	$15	$0	$0	$14	$15
Central	$427	$476	$0	$0	$427	$476
Eastern	$723	$805	$0	$0	$723	$805
Pacific	$13	$14	$0	$0	$13	$14
Southern	$577	$642	$0	$0	$577	$642
Western	$347	$386	$0	$0	$347	$386
Subtotal	**$2,101**	**$2,339**	**$0**	**$0**	**$2,101**	**$2,339**
Telecommunications						
Alaskan	$12	$14	$0	$0	$12	$14
Central	$641	$713	$0	$0	$641	$713
Eastern	$973	$1,083	$0	$0	$973	$1,083
Pacific	$12	$13	$0	$0	$12	$13
Southern	$884	$984	$0	$0	$884	$984
Western	$453	$505	$0	$0	$453	$505
Subtotal	**$2,975**	**$3,312**	**$0**	**$0**	**$2,975**	**$3,312**
Temporary Help Services						
Alaskan	$7	$8	$0	$0	$7	$8
Central	$6,812	$7,583	$0	$0	$6,812	$7,583
Eastern	$8,706	$9,692	$0	$0	$8,706	$9,692
Pacific	$204	$228	$0	$0	$204	$228
Southern	$14,093	$15,689	$0	$0	$14,093	$15,689
Western	$7,054	$7,853	$0	$0	$7,054	$7,853
Subtotal	**$36,877**	**$41,053**	**$0**	**$0**	**$36,877**	**$41,053**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Transportation						
Alaskan	$99	$110	$0	$0	$99	$110
Central	$4,282	$4,768	$0	$0	$4,282	$4,768
Eastern	$4,364	$4,859	$0	$0	$4,364	$4,859
Pacific	$147	$163	$0	$0	$147	$163
Southern	$5,809	$6,467	$0	$0	$5,809	$6,467
Western	$1,895	$2,110	$0	$0	$1,895	$2,110
Subtotal	**$16,597**	**$18,477**	**$0**	**$0**	**$16,597**	**$18,477**
Utilities						
Alaskan	$16	$18	$0	$0	$16	$18
Central	$1,233	$1,373	$0	$0	$1,233	$1,373
Eastern	$1,725	$1,921	$0	$0	$1,725	$1,921
Pacific	$7	$7	$0	$0	$7	$7
Southern	$1,477	$1,644	$0	$0	$1,477	$1,644
Western	$683	$760	$0	$0	$683	$760
Subtotal	**$5,141**	**$5,723**	**$0**	**$0**	**$5,141**	**$5,723**
Warehousing						
Alaskan	$3	$3	$0	$0	$3	$3
Central	$1,489	$1,658	$0	$0	$1,489	$1,658
Eastern	$2,181	$2,428	$0	$0	$2,181	$2,428
Pacific	$9	$10	$0	$0	$9	$10
Southern	$1,846	$2,055	$0	$0	$1,846	$2,055
Western	$1,211	$1,348	$0	$0	$1,211	$1,348
Subtotal	**$6,738**	**$7,502**	**$0**	**$0**	**$6,738**	**$7,502**
Non-Core						
Alaskan	$837	$932	$0	$0	$837	$932
Central	$68,086	$75,798	$0	$0	$68,086	$75,798
Eastern	$112,634	$125,392	$0	$0	$112,634	$125,392

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$1,673	$1,862	$0	$0	$1,673	$1,862
Southern	$62,705	$69,807	$0	$0	$62,705	$69,807
Western	$61,070	$67,987	$0	$0	$61,070	$67,987
Subtotal	**$307,005**	**$341,778**	**$0**	**$0**	**$307,005**	**$341,778**
Total Costs for Coolers with Spigot						
Alaskan	$1,676	$1,866	$0	$0	$1,676	$1,866
Central	$154,543	$172,047	$0	$0	$154,543	$172,047
Eastern	$222,731	$247,959	$0	$0	$222,731	$247,959
Pacific	$3,453	$3,844	$0	$0	$3,453	$3,844
Southern	$213,294	$237,453	$0	$0	$213,294	$237,453
Western	$143,251	$159,476	$0	$0	$143,251	$159,476
Total	**$738,948**	**$822,646**	**$0**	**$0**	**$738,948**	**$822,646**
Reusable Water Bottle						
Agriculture, Forestry, and Fishing						
Alaskan	$4	$5	$0	$0	$4	$5
Central	$537	$598	$0	$0	$537	$598
Eastern	$382	$425	$0	$0	$382	$425
Pacific	$4	$4	$0	$0	$4	$4
Southern	$573	$637	$0	$0	$573	$637
Western	$132	$147	$0	$0	$132	$147
Subtotal	**$1,632**	**$1,817**	**$0**	**$0**	**$1,632**	**$1,817**
Building Materials and Equipment Suppliers						
Alaskan	$7	$7	$0	$0	$7	$7
Central	$624	$695	$0	$0	$624	$695
Eastern	$775	$863	$0	$0	$775	$863
Pacific	$12	$13	$0	$0	$12	$13
Southern	$725	$807	$0	$0	$725	$807
Western	$442	$492	$0	$0	$442	$492

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$2,584**	**$2,877**	**$0**	**$0**	**$2,584**	**$2,877**
Commercial Kitchens						
Alaskan	$37	$41	$0	$0	$37	$41
Central	$4,363	$4,858	$0	$0	$4,363	$4,858
Eastern	$6,494	$7,229	$0	$0	$6,494	$7,229
Pacific	$141	$156	$0	$0	$141	$156
Southern	$5,829	$6,489	$0	$0	$5,829	$6,489
Western	$3,642	$4,054	$0	$0	$3,642	$4,054
Subtotal	**$20,505**	**$22,828**	**$0**	**$0**	**$20,505**	**$22,828**
Construction						
Alaskan	$69	$77	$0	$0	$69	$77
Central	$5,120	$5,700	$0	$0	$5,120	$5,700
Eastern	$7,463	$8,309	$0	$0	$7,463	$8,309
Pacific	$147	$164	$0	$0	$147	$164
Southern	$19,435	$21,636	$0	$0	$19,435	$21,636
Western	$5,487	$6,109	$0	$0	$5,487	$6,109
Subtotal	**$37,723**	**$41,996**	**$0**	**$0**	**$37,723**	**$41,996**
Drycleaning and Commercial Laundries						
Alaskan	$1	$1	$0	$0	$1	$1
Central	$82	$91	$0	$0	$82	$91
Eastern	$150	$167	$0	$0	$150	$167
Pacific	$3	$4	$0	$0	$3	$4
Southern	$118	$132	$0	$0	$118	$132
Western	$73	$82	$0	$0	$73	$82
Subtotal	**$427**	**$476**	**$0**	**$0**	**$427**	**$476**
Landscaping and Facilities Support						
Alaskan	$26	$28	$0	$0	$26	$28
Central	$1,615	$1,798	$0	$0	$1,615	$1,798

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$2,615	$2,911	$0	$0	$2,615	$2,911
Pacific	$51	$56	$0	$0	$51	$56
Southern	$2,166	$2,411	$0	$0	$2,166	$2,411
Western	$6,020	$6,702	$0	$0	$6,020	$6,702
Subtotal	**$12,492**	**$13,907**	**$0**	**$0**	**$12,492**	**$13,907**
Maintenance and Repair						
Alaskan	$8	$8	$0	$0	$8	$8
Central	$846	$941	$0	$0	$846	$941
Eastern	$1,092	$1,216	$0	$0	$1,092	$1,216
Pacific	$13	$15	$0	$0	$13	$15
Southern	$1,017	$1,133	$0	$0	$1,017	$1,133
Western	$634	$705	$0	$0	$634	$705
Subtotal	**$3,610**	**$4,019**	**$0**	**$0**	**$3,610**	**$4,019**
Manufacturing						
Alaskan	$21	$23	$0	$0	$21	$23
Central	$6,782	$7,550	$0	$0	$6,782	$7,550
Eastern	$6,278	$6,989	$0	$0	$6,278	$6,989
Pacific	$19	$21	$0	$0	$19	$21
Southern	$5,027	$5,597	$0	$0	$5,027	$5,597
Western	$3,256	$3,624	$0	$0	$3,256	$3,624
Subtotal	**$21,383**	**$23,805**	**$0**	**$0**	**$21,383**	**$23,805**
Oil and Gas						
Alaskan	$22	$25	$0	$0	$22	$25
Central	$163	$182	$0	$0	$163	$182
Eastern	$107	$119	$0	$0	$107	$119
Southern	$1,023	$1,139	$0	$0	$1,023	$1,139
Western	$214	$238	$0	$0	$214	$238
Subtotal	**$1,530**	**$1,703**	**$0**	**$0**	**$1,530**	**$1,703**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Postal and Delivery Services						
Alaskan	$2	$2	$0	$0	$2	$2
Central	$287	$320	$0	$0	$287	$320
Eastern	$459	$511	$0	$0	$459	$511
Pacific	$5	$5	$0	$0	$5	$5
Southern	$326	$363	$0	$0	$326	$363
Western	$229	$255	$0	$0	$229	$255
Subtotal	**$1,307**	**$1,455**	**$0**	**$0**	**$1,307**	**$1,455**
Recreation and Amusement						
Alaskan	$7	$8	$0	$0	$7	$8
Central	$696	$774	$0	$0	$696	$774
Eastern	$1,159	$1,290	$0	$0	$1,159	$1,290
Pacific	$15	$17	$0	$0	$15	$17
Southern	$908	$1,010	$0	$0	$908	$1,010
Western	$683	$760	$0	$0	$683	$760
Subtotal	**$3,467**	**$3,859**	**$0**	**$0**	**$3,467**	**$3,859**
Sanitation and Waste Removal						
Alaskan	$4	$5	$0	$0	$4	$5
Central	$126	$140	$0	$0	$126	$140
Eastern	$213	$238	$0	$0	$213	$238
Pacific	$4	$4	$0	$0	$4	$4
Southern	$170	$189	$0	$0	$170	$189
Western	$102	$114	$0	$0	$102	$114
Subtotal	**$620**	**$690**	**$0**	**$0**	**$620**	**$690**
Telecommunications						
Alaskan	$4	$4	$0	$0	$4	$4
Central	$189	$210	$0	$0	$189	$210
Eastern	$287	$320	$0	$0	$287	$320

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$3	$4	$0	$0	$3	$4
Southern	$261	$290	$0	$0	$261	$290
Western	$134	$149	$0	$0	$134	$149
Subtotal	**$878**	**$977**	**$0**	**$0**	**$878**	**$977**
Temporary Help Services						
Alaskan	$2	$2	$0	$0	$2	$2
Central	$2,010	$2,237	$0	$0	$2,010	$2,237
Eastern	$2,568	$2,859	$0	$0	$2,568	$2,859
Pacific	$60	$67	$0	$0	$60	$67
Southern	$4,158	$4,629	$0	$0	$4,158	$4,629
Western	$2,081	$2,317	$0	$0	$2,081	$2,317
Subtotal	**$10,880**	**$12,112**	**$0**	**$0**	**$10,880**	**$12,112**
Transportation						
Alaskan	$29	$33	$0	$0	$29	$33
Central	$1,263	$1,407	$0	$0	$1,263	$1,407
Eastern	$1,288	$1,434	$0	$0	$1,288	$1,434
Pacific	$43	$48	$0	$0	$43	$48
Southern	$1,714	$1,908	$0	$0	$1,714	$1,908
Western	$559	$622	$0	$0	$559	$622
Subtotal	**$4,897**	**$5,451**	**$0**	**$0**	**$4,897**	**$5,451**
Utilities						
Alaskan	$5	$5	$0	$0	$5	$5
Central	$364	$405	$0	$0	$364	$405
Eastern	$509	$567	$0	$0	$509	$567
Pacific	$2	$2	$0	$0	$2	$2
Southern	$436	$485	$0	$0	$436	$485
Western	$202	$224	$0	$0	$202	$224
Subtotal	**$1,517**	**$1,689**	**$0**	**$0**	**$1,517**	**$1,689**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Warehousing						
Alaskan	$1	$1	$0	$0	$1	$1
Central	$439	$489	$0	$0	$439	$489
Eastern	$643	$716	$0	$0	$643	$716
Pacific	$3	$3	$0	$0	$3	$3
Southern	$545	$606	$0	$0	$545	$606
Western	$357	$398	$0	$0	$357	$398
Subtotal	**$1,988**	**$2,213**	**$0**	**$0**	**$1,988**	**$2,213**
Non-Core						
Alaskan	$247	$275	$0	$0	$247	$275
Central	$20,088	$22,363	$0	$0	$20,088	$22,363
Eastern	$33,231	$36,995	$0	$0	$33,231	$36,995
Pacific	$494	$549	$0	$0	$494	$549
Southern	$18,500	$20,596	$0	$0	$18,500	$20,596
Western	$18,018	$20,059	$0	$0	$18,018	$20,059
Subtotal	**$90,578**	**$100,837**	**$0**	**$0**	**$90,578**	**$100,837**
Total Costs for Reusable Water Bottle						
Alaskan	$494	$550	$0	$0	$494	$550
Central	$45,596	$50,760	$0	$0	$45,596	$50,760
Eastern	$65,714	$73,157	$0	$0	$65,714	$73,157
Pacific	$1,019	$1,134	$0	$0	$1,019	$1,134
Southern	$62,930	$70,057	$0	$0	$62,930	$70,057
Western	$42,264	$47,051	$0	$0	$42,264	$47,051
Total	**$218,017**	**$242,711**	**$0**	**$0**	**$218,017**	**$242,711**
Outdoor Break Area Engineering Control						
Agriculture, Forestry, and Fishing						
Alaskan	$2,139	$2,381	$0	$0	$2,139	$2,381
Central	$148,614	$165,447	$0	$0	$148,614	$165,447

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$82,148	$91,452	$0	$0	$82,148	$91,452
Pacific	$1,094	$1,218	$0	$0	$1,094	$1,218
Southern	$141,834	$157,899	$0	$0	$141,834	$157,899
Western	$34,464	$38,367	$0	$0	$34,464	$38,367
Subtotal	**$410,292**	**$456,764**	**$0**	**$0**	**$410,292**	**$456,764**
Building Materials and Equipment Suppliers						
Alaskan	$113	$126	$0	$0	$113	$126
Central	$8,748	$9,738	$0	$0	$8,748	$9,738
Eastern	$12,576	$14,001	$0	$0	$12,576	$14,001
Pacific	$209	$233	$0	$0	$209	$233
Southern	$11,796	$13,133	$0	$0	$11,796	$13,133
Western	$7,958	$8,859	$0	$0	$7,958	$8,859
Subtotal	**$41,401**	**$46,090**	**$0**	**$0**	**$41,401**	**$46,090**
Commercial Kitchens						
Alaskan	$319	$355	$0	$0	$319	$355
Central	$24,910	$27,731	$0	$0	$24,910	$27,731
Eastern	$39,778	$44,284	$0	$0	$39,778	$44,284
Pacific	$766	$853	$0	$0	$766	$853
Southern	$28,473	$31,698	$0	$0	$28,473	$31,698
Western	$22,781	$25,361	$0	$0	$22,781	$25,361
Subtotal	**$117,026**	**$130,281**	**$0**	**$0**	**$117,026**	**$130,281**
Construction						
Alaskan	$4,131	$4,599	$0	$0	$4,131	$4,599
Central	$265,524	$295,599	$0	$0	$265,524	$295,599
Eastern	$385,284	$428,923	$0	$0	$385,284	$428,923
Pacific	$5,698	$6,343	$0	$0	$5,698	$6,343
Southern	$278,496	$310,040	$0	$0	$278,496	$310,040
Western	$116,376	$129,557	$0	$0	$116,376	$129,557

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$1,055,509**	**$1,175,062**	**$0**	**$0**	**$1,055,509**	**$1,175,062**
Drycleaning and Commercial Laundries						
Alaskan	$28	$31	$0	$0	$28	$31
Central	$3,440	$3,830	$0	$0	$3,440	$3,830
Eastern	$8,838	$9,839	$0	$0	$8,838	$9,839
Pacific	$70	$77	$0	$0	$70	$77
Southern	$5,216	$5,806	$0	$0	$5,216	$5,806
Western	$3,579	$3,984	$0	$0	$3,579	$3,984
Subtotal	**$21,170**	**$23,567**	**$0**	**$0**	**$21,170**	**$23,567**
Landscaping and Facilities Support						
Alaskan	$500	$556	$0	$0	$500	$556
Central	$53,460	$59,515	$0	$0	$53,460	$59,515
Eastern	$86,844	$96,680	$0	$0	$86,844	$96,680
Pacific	$1,227	$1,366	$0	$0	$1,227	$1,366
Southern	$60,819	$67,707	$0	$0	$60,819	$67,707
Western	$49,560	$55,173	$0	$0	$49,560	$55,173
Subtotal	**$252,409**	**$280,998**	**$0**	**$0**	**$252,409**	**$280,998**
Maintenance and Repair						
Alaskan	$553	$616	$0	$0	$553	$616
Central	$56,502	$62,902	$0	$0	$56,502	$62,902
Eastern	$75,259	$83,783	$0	$0	$75,259	$83,783
Pacific	$903	$1,005	$0	$0	$903	$1,005
Southern	$60,866	$67,760	$0	$0	$60,866	$67,760
Western	$44,596	$49,647	$0	$0	$44,596	$49,647
Subtotal	**$238,677**	**$265,711**	**$0**	**$0**	**$238,677**	**$265,711**
Manufacturing						
Alaskan	$109	$121	$0	$0	$109	$121
Central	$13,706	$15,258	$0	$0	$13,706	$15,258

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$16,157	$17,987	$0	$0	$16,157	$17,987
Pacific	$138	$153	$0	$0	$138	$153
Southern	$12,473	$13,886	$0	$0	$12,473	$13,886
Western	$10,469	$11,655	$0	$0	$10,469	$11,655
Subtotal	**$53,053**	**$59,062**	**$0**	**$0**	**$53,053**	**$59,062**
Oil and Gas						
Alaskan	$371	$413	$0	$0	$371	$413
Central	$14,887	$16,573	$0	$0	$14,887	$16,573
Eastern	$7,969	$8,871	$0	$0	$7,969	$8,871
Southern	$54,268	$60,415	$0	$0	$54,268	$60,415
Western	$7,404	$8,243	$0	$0	$7,404	$8,243
Subtotal	**$84,899**	**$94,515**	**$0**	**$0**	**$84,899**	**$94,515**
Postal and Delivery Services						
Alaskan	$660	$735	$0	$0	$660	$735
Central	$28,109	$31,293	$0	$0	$28,109	$31,293
Eastern	$35,229	$39,219	$0	$0	$35,229	$39,219
Pacific	$367	$409	$0	$0	$367	$409
Southern	$25,444	$28,325	$0	$0	$25,444	$28,325
Western	$14,637	$16,294	$0	$0	$14,637	$16,294
Subtotal	**$104,446**	**$116,276**	**$0**	**$0**	**$104,446**	**$116,276**
Recreation and Amusement						
Alaskan	$911	$1,014	$0	$0	$911	$1,014
Central	$35,982	$40,057	$0	$0	$35,982	$40,057
Eastern	$53,826	$59,922	$0	$0	$53,826	$59,922
Pacific	$666	$741	$0	$0	$666	$741
Southern	$35,056	$39,027	$0	$0	$35,056	$39,027
Western	$27,649	$30,780	$0	$0	$27,649	$30,780
Subtotal	**$154,089**	**$171,542**	**$0**	**$0**	**$154,089**	**$171,542**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Sanitation and Waste Removal						
Alaskan	$75	$83	$0	$0	$75	$83
Central	$2,469	$2,749	$0	$0	$2,469	$2,749
Eastern	$3,594	$4,001	$0	$0	$3,594	$4,001
Pacific	$56	$62	$0	$0	$56	$62
Southern	$2,609	$2,905	$0	$0	$2,609	$2,905
Western	$1,605	$1,787	$0	$0	$1,605	$1,787
Subtotal	**$10,408**	**$11,587**	**$0**	**$0**	**$10,408**	**$11,587**
Telecommunications						
Alaskan	$96	$107	$0	$0	$96	$107
Central	$5,824	$6,483	$0	$0	$5,824	$6,483
Eastern	$7,971	$8,874	$0	$0	$7,971	$8,874
Pacific	$87	$97	$0	$0	$87	$97
Southern	$7,002	$7,795	$0	$0	$7,002	$7,795
Western	$4,503	$5,013	$0	$0	$4,503	$5,013
Subtotal	**$25,482**	**$28,368**	**$0**	**$0**	**$25,482**	**$28,368**
Temporary Help Services						
Alaskan	$16	$18	$0	$0	$16	$18
Central	$3,116	$3,469	$0	$0	$3,116	$3,469
Eastern	$4,390	$4,888	$0	$0	$4,390	$4,888
Pacific	$42	$47	$0	$0	$42	$47
Southern	$3,728	$4,150	$0	$0	$3,728	$4,150
Western	$2,499	$2,782	$0	$0	$2,499	$2,782
Subtotal	**$13,791**	**$15,353**	**$0**	**$0**	**$13,791**	**$15,353**
Transportation						
Alaskan	$2,163	$2,408	$0	$0	$2,163	$2,408
Central	$130,909	$145,737	$0	$0	$130,909	$145,737
Eastern	$116,569	$129,772	$0	$0	$116,569	$129,772

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$1,448	$1,612	$0	$0	$1,448	$1,612
Southern	$118,579	$132,010	$0	$0	$118,579	$132,010
Western	$40,067	$44,605	$0	$0	$40,067	$44,605
Subtotal	**$409,735**	**$456,144**	**$0**	**$0**	**$409,735**	**$456,144**
Utilities						
Alaskan	$333	$370	$0	$0	$333	$370
Central	$14,246	$15,860	$0	$0	$14,246	$15,860
Eastern	$17,850	$19,872	$0	$0	$17,850	$19,872
Pacific	$121	$135	$0	$0	$121	$135
Southern	$19,989	$22,253	$0	$0	$19,989	$22,253
Western	$9,235	$10,281	$0	$0	$9,235	$10,281
Subtotal	**$61,775**	**$68,772**	**$0**	**$0**	**$61,775**	**$68,772**
Warehousing						
Alaskan	$37	$41	$0	$0	$37	$41
Central	$5,364	$5,971	$0	$0	$5,364	$5,971
Eastern	$6,782	$7,550	$0	$0	$6,782	$7,550
Pacific	$86	$96	$0	$0	$86	$96
Southern	$6,658	$7,412	$0	$0	$6,658	$7,412
Western	$4,713	$5,247	$0	$0	$4,713	$5,247
Subtotal	**$23,639**	**$26,317**	**$0**	**$0**	**$23,639**	**$26,317**
Non-Core						
Alaskan	$10,666	$11,875	$0	$0	$10,666	$11,875
Central	$771,392	$858,764	$0	$0	$771,392	$858,764
Eastern	$1,203,522	$1,339,839	$0	$0	$1,203,522	$1,339,839
Pacific	$19,907	$22,161	$0	$0	$19,907	$22,161
Southern	$938,300	$1,044,577	$0	$0	$938,300	$1,044,577
Western	$697,582	$776,594	$0	$0	$697,582	$776,594
Subtotal	**$3,641,370**	**$4,053,811**	**$0**	**$0**	**$3,641,370**	**$4,053,811**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Total Costs for Outdoor Break Area Engineering Control						
Alaskan	$23,219	$25,849	$0	$0	$23,219	$25,849
Central	$1,587,201	$1,766,975	$0	$0	$1,587,201	$1,766,975
Eastern	$2,164,586	$2,409,758	$0	$0	$2,164,586	$2,409,758
Pacific	$32,884	$36,608	$0	$0	$32,884	$36,608
Southern	$1,811,607	$2,016,799	$0	$0	$1,811,607	$2,016,799
Western	$1,099,676	$1,224,231	$0	$0	$1,099,676	$1,224,231
Total	**$6,719,171**	**$7,480,220**	**$0**	**$0**	**$6,719,171**	**$7,480,220**
Air Movement						
Agriculture, Forestry, and Fishing						
Alaskan	$329	$366	$0	$0	$329	$366
Central	$108,158	$120,408	$0	$0	$108,158	$120,408
Eastern	$60,978	$67,885	$0	$0	$60,978	$67,885
Pacific	$639	$711	$0	$0	$639	$711
Southern	$90,405	$100,644	$0	$0	$90,405	$100,644
Western	$154,877	$172,419	$0	$0	$154,877	$172,419
Subtotal	**$415,385**	**$462,433**	**$0**	**$0**	**$415,385**	**$462,433**
Building Materials and Equipment Suppliers						
Alaskan	$1,021	$1,137	$0	$0	$1,021	$1,137
Central	$95,087	$105,857	$0	$0	$95,087	$105,857
Eastern	$117,705	$131,037	$0	$0	$117,705	$131,037
Pacific	$1,817	$2,022	$0	$0	$1,817	$2,022
Southern	$108,302	$120,569	$0	$0	$108,302	$120,569
Western	$76,760	$85,455	$0	$0	$76,760	$85,455
Subtotal	**$400,693**	**$446,078**	**$0**	**$0**	**$400,693**	**$446,078**
Commercial Kitchens						
Alaskan	$7,767	$8,647	$0	$0	$7,767	$8,647
Central	$920,349	$1,024,593	$0	$0	$920,349	$1,024,593

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$1,369,741	$1,524,885	$0	$0	$1,369,741	$1,524,885
Pacific	$29,672	$33,033	$0	$0	$29,672	$33,033
Southern	$1,231,959	$1,371,497	$0	$0	$1,231,959	$1,371,497
Western	$855,252	$952,122	$0	$0	$855,252	$952,122
Subtotal	**$4,414,740**	**$4,914,777**	**$0**	**$0**	**$4,414,740**	**$4,914,777**
Construction						
Alaskan	$6,033	$6,716	$0	$0	$6,033	$6,716
Central	$434,847	$484,100	$0	$0	$434,847	$484,100
Eastern	$636,158	$708,213	$0	$0	$636,158	$708,213
Pacific	$12,280	$13,670	$0	$0	$12,280	$13,670
Southern	$613,504	$682,993	$0	$0	$613,504	$682,993
Western	$440,836	$490,768	$0	$0	$440,836	$490,768
Subtotal	**$2,143,659**	**$2,386,461**	**$0**	**$0**	**$2,143,659**	**$2,386,461**
Drycleaning and Commercial Laundries						
Alaskan	$120	$133	$0	$0	$120	$133
Central	$14,557	$16,206	$0	$0	$14,557	$16,206
Eastern	$26,699	$29,723	$0	$0	$26,699	$29,723
Pacific	$581	$647	$0	$0	$581	$647
Southern	$21,042	$23,425	$0	$0	$21,042	$23,425
Western	$14,307	$15,927	$0	$0	$14,307	$15,927
Subtotal	**$77,306**	**$86,062**	**$0**	**$0**	**$77,306**	**$86,062**
Landscaping and Facilities Support						
Alaskan	$2,383	$2,653	$0	$0	$2,383	$2,653
Central	$125,165	$139,342	$0	$0	$125,165	$139,342
Eastern	$202,660	$225,615	$0	$0	$202,660	$225,615
Pacific	$3,766	$4,193	$0	$0	$3,766	$4,193
Southern	$168,079	$187,117	$0	$0	$168,079	$187,117
Western	$113,917	$126,820	$0	$0	$113,917	$126,820

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$615,970**	**$685,738**	**$0**	**$0**	**$615,970**	**$685,738**
Maintenance and Repair						
Alaskan	$1,009	$1,124	$0	$0	$1,009	$1,124
Central	$112,682	$125,445	$0	$0	$112,682	$125,445
Eastern	$145,140	$161,579	$0	$0	$145,140	$161,579
Pacific	$1,762	$1,961	$0	$0	$1,762	$1,961
Southern	$136,568	$152,036	$0	$0	$136,568	$152,036
Western	$94,222	$104,894	$0	$0	$94,222	$104,894
Subtotal	**$491,382**	**$547,039**	**$0**	**$0**	**$491,382**	**$547,039**
Manufacturing						
Alaskan	$3,604	$4,012	$0	$0	$3,604	$4,012
Central	$1,299,063	$1,446,201	$0	$0	$1,299,063	$1,446,201
Eastern	$1,193,136	$1,328,277	$0	$0	$1,193,136	$1,328,277
Pacific	$3,459	$3,851	$0	$0	$3,459	$3,851
Southern	$941,420	$1,048,050	$0	$0	$941,420	$1,048,050
Western	$556,173	$619,168	$0	$0	$556,173	$619,168
Subtotal	**$3,996,855**	**$4,449,560**	**$0**	**$0**	**$3,996,855**	**$4,449,560**
Oil and Gas						
Alaskan	$1,954	$2,175	$0	$0	$1,954	$2,175
Central	$14,641	$16,299	$0	$0	$14,641	$16,299
Eastern	$9,558	$10,641	$0	$0	$9,558	$10,641
Southern	$90,159	$100,371	$0	$0	$90,159	$100,371
Western	$9,362	$10,422	$0	$0	$9,362	$10,422
Subtotal	**$125,674**	**$139,908**	**$0**	**$0**	**$125,674**	**$139,908**
Postal and Delivery Services						
Alaskan	$195	$217	$0	$0	$195	$217
Central	$38,356	$42,701	$0	$0	$38,356	$42,701
Eastern	$61,466	$68,428	$0	$0	$61,466	$68,428

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$601	$670	$0	$0	$601	$670
Southern	$43,628	$48,570	$0	$0	$43,628	$48,570
Western	$34,742	$38,677	$0	$0	$34,742	$38,677
Subtotal	**$178,989**	**$199,262**	**$0**	**$0**	**$178,989**	**$199,262**
Recreation and Amusement						
Alaskan	$711	$792	$0	$0	$711	$792
Central	$72,605	$80,828	$0	$0	$72,605	$80,828
Eastern	$120,964	$134,665	$0	$0	$120,964	$134,665
Pacific	$1,579	$1,757	$0	$0	$1,579	$1,757
Southern	$94,989	$105,748	$0	$0	$94,989	$105,748
Western	$80,440	$89,551	$0	$0	$80,440	$89,551
Subtotal	**$371,287**	**$413,341**	**$0**	**$0**	**$371,287**	**$413,341**
Sanitation and Waste Removal						
Alaskan	$402	$448	$0	$0	$402	$448
Central	$14,210	$15,819	$0	$0	$14,210	$15,819
Eastern	$23,287	$25,925	$0	$0	$23,287	$25,925
Pacific	$405	$451	$0	$0	$405	$451
Southern	$18,720	$20,840	$0	$0	$18,720	$20,840
Western	$13,505	$15,035	$0	$0	$13,505	$15,035
Subtotal	**$70,529**	**$78,518**	**$0**	**$0**	**$70,529**	**$78,518**
Telecommunications						
Alaskan	$484	$539	$0	$0	$484	$539
Central	$25,066	$27,905	$0	$0	$25,066	$27,905
Eastern	$38,069	$42,381	$0	$0	$38,069	$42,381
Pacific	$454	$505	$0	$0	$454	$505
Southern	$34,579	$38,496	$0	$0	$34,579	$38,496
Western	$21,013	$23,393	$0	$0	$21,013	$23,393
Subtotal	**$119,665**	**$133,218**	**$0**	**$0**	**$119,665**	**$133,218**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Temporary Help Services						
Alaskan	$339	$377	$0	$0	$339	$377
Central	$318,045	$354,068	$0	$0	$318,045	$354,068
Eastern	$406,486	$452,527	$0	$0	$406,486	$452,527
Pacific	$9,548	$10,629	$0	$0	$9,548	$10,629
Southern	$658,041	$732,574	$0	$0	$658,041	$732,574
Western	$343,674	$382,600	$0	$0	$343,674	$382,600
Subtotal	**$1,736,132**	**$1,932,776**	**$0**	**$0**	**$1,736,132**	**$1,932,776**
Transportation						
Alaskan	$2,987	$3,325	$0	$0	$2,987	$3,325
Central	$134,943	$150,227	$0	$0	$134,943	$150,227
Eastern	$138,796	$154,516	$0	$0	$138,796	$154,516
Pacific	$4,572	$5,089	$0	$0	$4,572	$5,089
Southern	$183,350	$204,117	$0	$0	$183,350	$204,117
Western	$101,601	$113,109	$0	$0	$101,601	$113,109
Subtotal	**$566,248**	**$630,384**	**$0**	**$0**	**$566,248**	**$630,384**
Utilities						
Alaskan	$499	$556	$0	$0	$499	$556
Central	$37,661	$41,927	$0	$0	$37,661	$41,927
Eastern	$52,688	$58,655	$0	$0	$52,688	$58,655
Pacific	$206	$229	$0	$0	$206	$229
Southern	$45,122	$50,233	$0	$0	$45,122	$50,233
Western	$22,843	$25,430	$0	$0	$22,843	$25,430
Subtotal	**$159,019**	**$177,031**	**$0**	**$0**	**$159,019**	**$177,031**
Warehousing						
Alaskan	$125	$139	$0	$0	$125	$139
Central	$73,616	$81,954	$0	$0	$73,616	$81,954
Eastern	$107,817	$120,029	$0	$0	$107,817	$120,029

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$446	$497	$0	$0	$446	$497
Southern	$91,232	$101,565	$0	$0	$91,232	$101,565
Western	$65,675	$73,114	$0	$0	$65,675	$73,114
Subtotal	**$338,911**	**$377,297**	**$0**	**$0**	**$338,911**	**$377,297**
Non-Core						
Alaskan	$53,752	$59,840	$0	$0	$53,752	$59,840
Central	$4,747,729	$5,285,482	$0	$0	$4,747,729	$5,285,482
Eastern	$7,725,828	$8,600,896	$0	$0	$7,725,828	$8,600,896
Pacific	$112,841	$125,622	$0	$0	$112,841	$125,622
Southern	$4,614,342	$5,136,987	$0	$0	$4,614,342	$5,136,987
Western	$4,639,061	$5,164,506	$0	$0	$4,639,061	$5,164,506
Subtotal	**$21,893,554**	**$24,373,334**	**$0**	**$0**	**$21,893,554**	**$24,373,334**
Total Costs for Air Movement						
Alaskan	$83,713	$93,195	$0	$0	$83,713	$93,195
Central	$8,586,779	$9,559,363	$0	$0	$8,586,779	$9,559,363
Eastern	$12,437,176	$13,845,877	$0	$0	$12,437,176	$13,845,877
Pacific	$184,628	$205,540	$0	$0	$184,628	$205,540
Southern	$9,185,441	$10,225,833	$0	$0	$9,185,441	$10,225,833
Western	$7,638,260	$8,503,410	$0	$0	$7,638,260	$8,503,410
Total	**$38,115,998**	**$42,433,217**	**$0**	**$0**	**$38,115,998**	**$42,433,217**
Humidity Control						
Agriculture, Forestry, and Fishing						
Alaskan	$95	$106	$0	$0	$95	$106
Central	$31,400	$34,957	$0	$0	$31,400	$34,957
Eastern	$17,703	$19,708	$0	$0	$17,703	$19,708
Pacific	$185	$206	$0	$0	$185	$206
Southern	$25,671	$28,578	$0	$0	$25,671	$28,578
Western	$42,556	$47,376	$0	$0	$42,556	$47,376

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Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$117,611**	**$130,932**	**$0**	**$0**	**$117,611**	**$130,932**
Building Materials and Equipment Suppliers						
Alaskan	$297	$330	$0	$0	$297	$330
Central	$27,606	$30,732	$0	$0	$27,606	$30,732
Eastern	$34,172	$38,042	$0	$0	$34,172	$38,042
Pacific	$527	$587	$0	$0	$527	$587
Southern	$30,778	$34,264	$0	$0	$30,778	$34,264
Western	$18,585	$20,690	$0	$0	$18,585	$20,690
Subtotal	**$111,964**	**$124,646**	**$0**	**$0**	**$111,964**	**$124,646**
Commercial Kitchens						
Alaskan	$2,255	$2,510	$0	$0	$2,255	$2,510
Central	$267,194	$297,458	$0	$0	$267,194	$297,458
Eastern	$397,660	$442,701	$0	$0	$397,660	$442,701
Pacific	$8,614	$9,590	$0	$0	$8,614	$9,590
Southern	$349,840	$389,465	$0	$0	$349,840	$389,465
Western	$198,024	$220,453	$0	$0	$198,024	$220,453
Subtotal	**$1,223,587**	**$1,362,177**	**$0**	**$0**	**$1,223,587**	**$1,362,177**
Construction						
Alaskan	$1,751	$1,950	$0	$0	$1,751	$1,950
Central	$126,244	$140,543	$0	$0	$126,244	$140,543
Eastern	$184,688	$205,607	$0	$0	$184,688	$205,607
Pacific	$3,565	$3,969	$0	$0	$3,565	$3,969
Southern	$174,434	$194,191	$0	$0	$174,434	$194,191
Western	$99,311	$110,559	$0	$0	$99,311	$110,559
Subtotal	**$589,993**	**$656,819**	**$0**	**$0**	**$589,993**	**$656,819**
Drycleaning and Commercial Laundries						
Alaskan	$35	$39	$0	$0	$35	$39
Central	$4,226	$4,705	$0	$0	$4,226	$4,705

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$7,751	$8,629	$0	$0	$7,751	$8,629
Pacific	$169	$188	$0	$0	$169	$188
Southern	$5,975	$6,651	$0	$0	$5,975	$6,651
Western	$3,210	$3,573	$0	$0	$3,210	$3,573
Subtotal	**$21,365**	**$23,785**	**$0**	**$0**	**$21,365**	**$23,785**
Landscaping and Facilities Support						
Alaskan	$692	$770	$0	$0	$692	$770
Central	$36,338	$40,453	$0	$0	$36,338	$40,453
Eastern	$58,836	$65,500	$0	$0	$58,836	$65,500
Pacific	$1,093	$1,217	$0	$0	$1,093	$1,217
Southern	$48,013	$53,451	$0	$0	$48,013	$53,451
Western	$25,082	$27,923	$0	$0	$25,082	$27,923
Subtotal	**$170,054**	**$189,315**	**$0**	**$0**	**$170,054**	**$189,315**
Maintenance and Repair						
Alaskan	$293	$326	$0	$0	$293	$326
Central	$32,714	$36,419	$0	$0	$32,714	$36,419
Eastern	$42,137	$46,909	$0	$0	$42,137	$46,909
Pacific	$511	$569	$0	$0	$511	$569
Southern	$38,727	$43,113	$0	$0	$38,727	$43,113
Western	$21,788	$24,255	$0	$0	$21,788	$24,255
Subtotal	**$136,169**	**$151,592**	**$0**	**$0**	**$136,169**	**$151,592**
Manufacturing						
Alaskan	$1,046	$1,165	$0	$0	$1,046	$1,165
Central	$377,141	$419,858	$0	$0	$377,141	$419,858
Eastern	$346,389	$385,622	$0	$0	$346,389	$385,622
Pacific	$1,004	$1,118	$0	$0	$1,004	$1,118
Southern	$271,764	$302,545	$0	$0	$271,764	$302,545
Western	$136,507	$151,968	$0	$0	$136,507	$151,968

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Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$1,133,851**	**$1,262,277**	**$0**	**$0**	**$1,133,851**	**$1,262,277**
Oil and Gas						
Alaskan	$567	$631	$0	$0	$567	$631
Central	$4,250	$4,732	$0	$0	$4,250	$4,732
Eastern	$2,775	$3,089	$0	$0	$2,775	$3,089
Southern	$24,984	$27,813	$0	$0	$24,984	$27,813
Western	$2,148	$2,392	$0	$0	$2,148	$2,392
Subtotal	**$34,724**	**$38,657**	**$0**	**$0**	**$34,724**	**$38,657**
Postal and Delivery Services						
Alaskan	$56	$63	$0	$0	$56	$63
Central	$11,136	$12,397	$0	$0	$11,136	$12,397
Eastern	$17,845	$19,866	$0	$0	$17,845	$19,866
Pacific	$175	$194	$0	$0	$175	$194
Southern	$12,429	$13,836	$0	$0	$12,429	$13,836
Western	$8,172	$9,097	$0	$0	$8,172	$9,097
Subtotal	**$49,812**	**$55,453**	**$0**	**$0**	**$49,812**	**$55,453**
Recreation and Amusement						
Alaskan	$207	$230	$0	$0	$207	$230
Central	$21,078	$23,466	$0	$0	$21,078	$23,466
Eastern	$35,118	$39,096	$0	$0	$35,118	$39,096
Pacific	$458	$510	$0	$0	$458	$510
Southern	$27,043	$30,106	$0	$0	$27,043	$30,106
Western	$19,011	$21,164	$0	$0	$19,011	$21,164
Subtotal	**$102,915**	**$114,572**	**$0**	**$0**	**$102,915**	**$114,572**
Sanitation and Waste Removal						
Alaskan	$117	$130	$0	$0	$117	$130
Central	$4,125	$4,593	$0	$0	$4,125	$4,593
Eastern	$6,761	$7,527	$0	$0	$6,761	$7,527

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$118	$131	$0	$0	$118	$131
Southern	$5,329	$5,933	$0	$0	$5,329	$5,933
Western	$3,191	$3,553	$0	$0	$3,191	$3,553
Subtotal	**$19,641**	**$21,866**	**$0**	**$0**	**$19,641**	**$21,866**
Telecommunications						
Alaskan	$141	$157	$0	$0	$141	$157
Central	$7,277	$8,101	$0	$0	$7,277	$8,101
Eastern	$11,052	$12,304	$0	$0	$11,052	$12,304
Pacific	$132	$147	$0	$0	$132	$147
Southern	$9,825	$10,938	$0	$0	$9,825	$10,938
Western	$4,802	$5,346	$0	$0	$4,802	$5,346
Subtotal	**$33,228**	**$36,991**	**$0**	**$0**	**$33,228**	**$36,991**
Temporary Help Services						
Alaskan	$98	$110	$0	$0	$98	$110
Central	$92,334	$102,792	$0	$0	$92,334	$102,792
Eastern	$118,010	$131,377	$0	$0	$118,010	$131,377
Pacific	$2,772	$3,086	$0	$0	$2,772	$3,086
Southern	$190,450	$212,021	$0	$0	$190,450	$212,021
Western	$78,264	$87,129	$0	$0	$78,264	$87,129
Subtotal	**$481,928**	**$536,514**	**$0**	**$0**	**$481,928**	**$536,514**
Transportation						
Alaskan	$867	$965	$0	$0	$867	$965
Central	$39,176	$43,614	$0	$0	$39,176	$43,614
Eastern	$40,295	$44,859	$0	$0	$40,295	$44,859
Pacific	$1,327	$1,478	$0	$0	$1,327	$1,478
Southern	$52,599	$58,556	$0	$0	$52,599	$58,556
Western	$22,771	$25,350	$0	$0	$22,771	$25,350
Subtotal	**$157,035**	**$174,822**	**$0**	**$0**	**$157,035**	**$174,822**

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Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Utilities						
Alaskan	$145	$161	$0	$0	$145	$161
Central	$10,934	$12,172	$0	$0	$10,934	$12,172
Eastern	$15,296	$17,029	$0	$0	$15,296	$17,029
Pacific	$60	$67	$0	$0	$60	$67
Southern	$12,788	$14,236	$0	$0	$12,788	$14,236
Western	$5,328	$5,931	$0	$0	$5,328	$5,931
Subtotal	**$44,550**	**$49,596**	**$0**	**$0**	**$44,550**	**$49,596**
Warehousing						
Alaskan	$36	$40	$0	$0	$36	$40
Central	$21,372	$23,793	$0	$0	$21,372	$23,793
Eastern	$31,301	$34,846	$0	$0	$31,301	$34,846
Pacific	$130	$144	$0	$0	$130	$144
Southern	$26,358	$29,343	$0	$0	$26,358	$29,343
Western	$15,033	$16,735	$0	$0	$15,033	$16,735
Subtotal	**$94,230**	**$104,902**	**$0**	**$0**	**$94,230**	**$104,902**
Non-Core						
Alaskan	$15,605	$17,373	$0	$0	$15,605	$17,373
Central	$1,378,350	$1,534,470	$0	$0	$1,378,350	$1,534,470
Eastern	$2,242,945	$2,496,993	$0	$0	$2,242,945	$2,496,993
Pacific	$32,760	$36,470	$0	$0	$32,760	$36,470
Southern	$1,298,373	$1,445,433	$0	$0	$1,298,373	$1,445,433
Western	$1,074,393	$1,196,084	$0	$0	$1,074,393	$1,196,084
Subtotal	**$6,042,426**	**$6,726,823**	**$0**	**$0**	**$6,042,426**	**$6,726,823**
Total Costs for Humidity Control						
Alaskan	$24,304	$27,056	$0	$0	$24,304	$27,056
Central	$2,492,895	$2,775,253	$0	$0	$2,492,895	$2,775,253
Eastern	$3,610,734	$4,019,704	$0	$0	$3,610,734	$4,019,704

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$53,601	$59,672	$0	$0	$53,601	$59,672
Southern	$2,605,377	$2,900,476	$0	$0	$2,605,377	$2,900,476
Western	$1,778,174	$1,979,579	$0	$0	$1,778,174	$1,979,579
Total	**$10,565,084**	**$11,761,741**	**$0**	**$0**	**$10,565,084**	**$11,761,741**
New Employee Acclimatization – Designated Person						
Agriculture, Forestry, and Fishing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$22,683	$0	$22,683	$22,683
Eastern	$0	$0	$14,046	$0	$14,046	$14,046
Pacific	$0	$0	$658	$0	$658	$658
Southern	$0	$0	$34,594	$0	$34,594	$34,594
Western	$0	$0	$10,637	$0	$10,637	$10,637
Subtotal	**$0**	**$0**	**$82,618**	**$0**	**$82,618**	**$82,618**
Building Materials and Equipment Suppliers						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$8,839	$0	$8,839	$8,839
Eastern	$0	$0	$10,086	$0	$10,086	$10,086
Pacific	$0	$0	$756	$0	$756	$756
Southern	$0	$0	$17,336	$0	$17,336	$17,336
Western	$0	$0	$7,440	$0	$7,440	$7,440
Subtotal	**$0**	**$0**	**$44,458**	**$0**	**$44,458**	**$44,458**
Commercial Kitchens						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$66,528	$0	$66,528	$66,528
Eastern	$0	$0	$93,907	$0	$93,907	$93,907
Pacific	$0	$0	$9,308	$0	$9,308	$9,308
Southern	$0	$0	$159,557	$0	$159,557	$159,557
Western	$0	$0	$66,267	$0	$66,267	$66,267

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$0**	**$0**	**$395,566**	**$0**	**$395,566**	**$395,566**
Construction						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$129,541	$0	$129,541	$129,541
Eastern	$0	$0	$177,518	$0	$177,518	$177,518
Pacific	$0	$0	$16,312	$0	$16,312	$16,312
Southern	$0	$0	$294,027	$0	$294,027	$294,027
Western	$0	$0	$66,918	$0	$66,918	$66,918
Subtotal	**$0**	**$0**	**$684,317**	**$0**	**$684,317**	**$684,317**
Drycleaning and Commercial Laundries						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$1,288	$0	$1,288	$1,288
Eastern	$0	$0	$2,184	$0	$2,184	$2,184
Pacific	$0	$0	$228	$0	$228	$228
Southern	$0	$0	$3,057	$0	$3,057	$3,057
Western	$0	$0	$1,351	$0	$1,351	$1,351
Subtotal	**$0**	**$0**	**$8,108**	**$0**	**$8,108**	**$8,108**
Landscaping and Facilities Support						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$23,521	$0	$23,521	$23,521
Eastern	$0	$0	$35,839	$0	$35,839	$35,839
Pacific	$0	$0	$3,250	$0	$3,250	$3,250
Southern	$0	$0	$52,232	$0	$52,232	$52,232
Western	$0	$0	$28,306	$0	$28,306	$28,306
Subtotal	**$0**	**$0**	**$143,148**	**$0**	**$143,148**	**$143,148**
Maintenance and Repair						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$13,304	$0	$13,304	$13,304

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Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$16,305	$0	$16,305	$16,305
Pacific	$0	$0	$931	$0	$931	$931
Southern	$0	$0	$26,401	$0	$26,401	$26,401
Western	$0	$0	$11,705	$0	$11,705	$11,705
Subtotal	**$0**	**$0**	**$68,645**	**$0**	**$68,645**	**$68,645**
Manufacturing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$96,792	$0	$96,792	$96,792
Eastern	$0	$0	$91,190	$0	$91,190	$91,190
Pacific	$0	$0	$1,258	$0	$1,258	$1,258
Southern	$0	$0	$117,159	$0	$117,159	$117,159
Western	$0	$0	$44,603	$0	$44,603	$44,603
Subtotal	**$0**	**$0**	**$351,003**	**$0**	**$351,003**	**$351,003**
Oil and Gas						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$4,390	$0	$4,390	$4,390
Eastern	$0	$0	$2,615	$0	$2,615	$2,615
Southern	$0	$0	$40,324	$0	$40,324	$40,324
Western	$0	$0	$2,640	$0	$2,640	$2,640
Subtotal	**$0**	**$0**	**$49,968**	**$0**	**$49,968**	**$49,968**
Postal and Delivery Services						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$5,530	$0	$5,530	$5,530
Eastern	$0	$0	$8,245	$0	$8,245	$8,245
Pacific	$0	$0	$390	$0	$390	$390
Southern	$0	$0	$10,789	$0	$10,789	$10,789
Western	$0	$0	$5,187	$0	$5,187	$5,187
Subtotal	**$0**	**$0**	**$30,140**	**$0**	**$30,140**	**$30,140**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Recreation and Amusement						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$15,389	$0	$15,389	$15,389
Eastern	$0	$0	$24,238	$0	$24,238	$24,238
Pacific	$0	$0	$1,474	$0	$1,474	$1,474
Southern	$0	$0	$39,175	$0	$39,175	$39,175
Western	$0	$0	$18,246	$0	$18,246	$18,246
Subtotal	**$0**	**$0**	**$98,522**	**$0**	**$98,522**	**$98,522**
Sanitation and Waste Removal						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$1,782	$0	$1,782	$1,782
Eastern	$0	$0	$2,781	$0	$2,781	$2,781
Pacific	$0	$0	$237	$0	$237	$237
Southern	$0	$0	$3,921	$0	$3,921	$3,921
Western	$0	$0	$1,742	$0	$1,742	$1,742
Subtotal	**$0**	**$0**	**$10,462**	**$0**	**$10,462**	**$10,462**
Telecommunications						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$3,528	$0	$3,528	$3,528
Eastern	$0	$0	$4,889	$0	$4,889	$4,889
Pacific	$0	$0	$274	$0	$274	$274
Southern	$0	$0	$7,485	$0	$7,485	$7,485
Western	$0	$0	$2,908	$0	$2,908	$2,908
Subtotal	**$0**	**$0**	**$19,083**	**$0**	**$19,083**	**$19,083**
Temporary Help Services						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$28,772	$0	$28,772	$28,772
Eastern	$0	$0	$35,627	$0	$35,627	$35,627

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$3,810	$0	$3,810	$3,810
Southern	$0	$0	$107,950	$0	$107,950	$107,950
Western	$0	$0	$33,490	$0	$33,490	$33,490
Subtotal	**$0**	**$0**	**$209,649**	**$0**	**$209,649**	**$209,649**
Transportation						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$24,480	$0	$24,480	$24,480
Eastern	$0	$0	$23,617	$0	$23,617	$23,617
Pacific	$0	$0	$3,687	$0	$3,687	$3,687
Southern	$0	$0	$55,722	$0	$55,722	$55,722
Western	$0	$0	$13,832	$0	$13,832	$13,832
Subtotal	**$0**	**$0**	**$121,339**	**$0**	**$121,339**	**$121,339**
Utilities						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$9,201	$0	$9,201	$9,201
Eastern	$0	$0	$12,379	$0	$12,379	$12,379
Pacific	$0	$0	$229	$0	$229	$229
Southern	$0	$0	$18,581	$0	$18,581	$18,581
Western	$0	$0	$6,092	$0	$6,092	$6,092
Subtotal	**$0**	**$0**	**$46,483**	**$0**	**$46,483**	**$46,483**
Warehousing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$8,709	$0	$8,709	$8,709
Eastern	$0	$0	$12,191	$0	$12,191	$12,191
Pacific	$0	$0	$227	$0	$227	$227
Southern	$0	$0	$16,982	$0	$16,982	$16,982
Western	$0	$0	$8,107	$0	$8,107	$8,107
Subtotal	**$0**	**$0**	**$46,217**	**$0**	**$46,217**	**$46,217**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Non-Core						
Alaskan	$0	$0	$2	$0	$2	$2
Central	$0	$0	$525,443	$0	$525,443	$525,443
Eastern	$0	$0	$818,290	$0	$818,290	$818,290
Pacific	$0	$0	$56,311	$0	$56,311	$56,311
Southern	$0	$0	$902,582	$0	$902,582	$902,582
Western	$0	$0	$549,837	$0	$549,837	$549,837
Subtotal	**$0**	**$0**	**$2,852,465**	**$0**	**$2,852,465**	**$2,852,465**
Total Costs for New Employee Acclimatization – Designated Person						
Alaskan	$0	$0	$3	$0	$3	$3
Central	$0	$0	$989,721	$0	$989,721	$989,721
Eastern	$0	$0	$1,385,945	$0	$1,385,945	$1,385,945
Pacific	$0	$0	$99,338	$0	$99,338	$99,338
Southern	$0	$0	$1,907,875	$0	$1,907,875	$1,907,875
Western	$0	$0	$879,308	$0	$879,308	$879,308
Total	**$0**	**$0**	**$5,262,190**	**$0**	**$5,262,190**	**$5,262,190**
Returning Employee Acclimatization – Designated Person						
Agriculture, Forestry, and Fishing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$550	$0	$550	$550
Eastern	$0	$0	$341	$0	$341	$341
Pacific	$0	$0	$16	$0	$16	$16
Southern	$0	$0	$839	$0	$839	$839
Western	$0	$0	$258	$0	$258	$258
Subtotal	**$0**	**$0**	**$2,003**	**$0**	**$2,003**	**$2,003**
Building Materials and Equipment Suppliers						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$252	$0	$252	$252

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Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$308	$0	$308	$308
Pacific	$0	$0	$21	$0	$21	$21
Southern	$0	$0	$523	$0	$523	$523
Western	$0	$0	$226	$0	$226	$226
Subtotal	**$0**	**$0**	**$1,329**	**$0**	**$1,329**	**$1,329**
Commercial Kitchens						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$429	$0	$429	$429
Eastern	$0	$0	$606	$0	$606	$606
Pacific	$0	$0	$63	$0	$63	$63
Southern	$0	$0	$996	$0	$996	$996
Western	$0	$0	$429	$0	$429	$429
Subtotal	**$0**	**$0**	**$2,524**	**$0**	**$2,524**	**$2,524**
Construction						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$2,049	$0	$2,049	$2,049
Eastern	$0	$0	$2,806	$0	$2,806	$2,806
Pacific	$0	$0	$258	$0	$258	$258
Southern	$0	$0	$4,652	$0	$4,652	$4,652
Western	$0	$0	$1,053	$0	$1,053	$1,053
Subtotal	**$0**	**$0**	**$10,819**	**$0**	**$10,819**	**$10,819**
Drycleaning and Commercial Laundries						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$33	$0	$33	$33
Eastern	$0	$0	$56	$0	$56	$56
Pacific	$0	$0	$6	$0	$6	$6
Southern	$0	$0	$79	$0	$79	$79
Western	$0	$0	$35	$0	$35	$35

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Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$0**	**$0**	**$209**	**$0**	**$209**	**$209**
Landscaping and Facilities Support						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$779	$0	$779	$779
Eastern	$0	$0	$1,186	$0	$1,186	$1,186
Pacific	$0	$0	$107	$0	$107	$107
Southern	$0	$0	$1,731	$0	$1,731	$1,731
Western	$0	$0	$946	$0	$946	$946
Subtotal	**$0**	**$0**	**$4,748**	**$0**	**$4,748**	**$4,748**
Maintenance and Repair						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$343	$0	$343	$343
Eastern	$0	$0	$420	$0	$420	$420
Pacific	$0	$0	$24	$0	$24	$24
Southern	$0	$0	$680	$0	$680	$680
Western	$0	$0	$302	$0	$302	$302
Subtotal	**$0**	**$0**	**$1,769**	**$0**	**$1,769**	**$1,769**
Manufacturing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$3,339	$0	$3,339	$3,339
Eastern	$0	$0	$3,146	$0	$3,146	$3,146
Pacific	$0	$0	$43	$0	$43	$43
Southern	$0	$0	$4,042	$0	$4,042	$4,042
Western	$0	$0	$1,539	$0	$1,539	$1,539
Subtotal	**$0**	**$0**	**$12,108**	**$0**	**$12,108**	**$12,108**
Oil and Gas						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$103	$0	$103	$103

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$61	$0	$61	$61
Southern	$0	$0	$958	$0	$958	$958
Western	$0	$0	$62	$0	$62	$62
Subtotal	**$0**	**$0**	**$1,184**	**$0**	**$1,184**	**$1,184**
Postal and Delivery Services						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$102	$0	$102	$102
Eastern	$0	$0	$152	$0	$152	$152
Pacific	$0	$0	$7	$0	$7	$7
Southern	$0	$0	$199	$0	$199	$199
Western	$0	$0	$96	$0	$96	$96
Subtotal	**$0**	**$0**	**$556**	**$0**	**$556**	**$556**
Recreation and Amusement						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$68	$0	$68	$68
Eastern	$0	$0	$108	$0	$108	$108
Pacific	$0	$0	$7	$0	$7	$7
Southern	$0	$0	$174	$0	$174	$174
Western	$0	$0	$81	$0	$81	$81
Subtotal	**$0**	**$0**	**$437**	**$0**	**$437**	**$437**
Sanitation and Waste Removal						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$61	$0	$61	$61
Eastern	$0	$0	$96	$0	$96	$96
Pacific	$0	$0	$8	$0	$8	$8
Southern	$0	$0	$135	$0	$135	$135
Western	$0	$0	$60	$0	$60	$60
Subtotal	**$0**	**$0**	**$359**	**$0**	**$359**	**$359**

Disclaimer: This proposed rule has been submitted to the Office of the Federal Register (OFR) for publication, and is currently pending placement on public inspection at the OFR and publication in the Federal Register. This draft version of the proposed rule may vary slightly from the published document if minor technical or formatting changes are made during the OFR review process. Only the version published in the Federal Register is the official proposed rule.

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Telecommunications						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$167	$0	$167	$167
Eastern	$0	$0	$231	$0	$231	$231
Pacific	$0	$0	$13	$0	$13	$13
Southern	$0	$0	$354	$0	$354	$354
Western	$0	$0	$138	$0	$138	$138
Subtotal	**$0**	**$0**	**$903**	**$0**	**$903**	**$903**
Temporary Help Services						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$988	$0	$988	$988
Eastern	$0	$0	$1,224	$0	$1,224	$1,224
Pacific	$0	$0	$131	$0	$131	$131
Southern	$0	$0	$3,708	$0	$3,708	$3,708
Western	$0	$0	$1,150	$0	$1,150	$1,150
Subtotal	**$0**	**$0**	**$7,201**	**$0**	**$7,201**	**$7,201**
Transportation						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$452	$0	$452	$452
Eastern	$0	$0	$436	$0	$436	$436
Pacific	$0	$0	$68	$0	$68	$68
Southern	$0	$0	$1,029	$0	$1,029	$1,029
Western	$0	$0	$255	$0	$255	$255
Subtotal	**$0**	**$0**	**$2,240**	**$0**	**$2,240**	**$2,240**
Utilities						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$221	$0	$221	$221
Eastern	$0	$0	$298	$0	$298	$298

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$6	$0	$6	$6
Southern	$0	$0	$447	$0	$447	$447
Western	$0	$0	$147	$0	$147	$147
Subtotal	**$0**	**$0**	**$1,118**	**$0**	**$1,118**	**$1,118**
Warehousing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$161	$0	$161	$161
Eastern	$0	$0	$225	$0	$225	$225
Pacific	$0	$0	$4	$0	$4	$4
Southern	$0	$0	$314	$0	$314	$314
Western	$0	$0	$150	$0	$150	$150
Subtotal	**$0**	**$0**	**$853**	**$0**	**$853**	**$853**
Non-Core						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$18,283	$0	$18,283	$18,283
Eastern	$0	$0	$28,957	$0	$28,957	$28,957
Pacific	$0	$0	$1,869	$0	$1,869	$1,869
Southern	$0	$0	$25,241	$0	$25,241	$25,241
Western	$0	$0	$20,730	$0	$20,730	$20,730
Subtotal	**$0**	**$0**	**$95,080**	**$0**	**$95,080**	**$95,080**
Total Costs for Returning Employee Acclimatization – Designated Person						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$28,381	$0	$28,381	$28,381
Eastern	$0	$0	$40,657	$0	$40,657	$40,657
Pacific	$0	$0	$2,651	$0	$2,651	$2,651
Southern	$0	$0	$46,100	$0	$46,100	$46,100
Western	$0	$0	$27,656	$0	$27,656	$27,656
Total	**$0**	**$0**	**$145,444**	**$0**	**$145,444**	**$145,444**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
New Indoor Employee Acclimatization						
Agriculture, Forestry, and Fishing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$193,345	$0	$193,345	$193,345
Eastern	$0	$0	$118,157	$0	$118,157	$118,157
Pacific	$0	$0	$5,594	$0	$5,594	$5,594
Southern	$0	$0	$292,499	$0	$292,499	$292,499
Western	$0	$0	$90,313	$0	$90,313	$90,313
Subtotal	**$0**	**$0**	**$699,909**	**$0**	**$699,909**	**$699,909**
Building Materials and Equipment Suppliers						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$200,995	$0	$200,995	$200,995
Eastern	$0	$0	$228,631	$0	$228,631	$228,631
Pacific	$0	$0	$17,117	$0	$17,117	$17,117
Southern	$0	$0	$387,695	$0	$387,695	$387,695
Western	$0	$0	$167,006	$0	$167,006	$167,006
Subtotal	**$0**	**$0**	**$1,001,445**	**$0**	**$1,001,445**	**$1,001,445**
Commercial Kitchens						
Alaskan	$0	$0	$6	$0	$6	$6
Central	$0	$0	$2,459,217	$0	$2,459,217	$2,459,217
Eastern	$0	$0	$3,471,889	$0	$3,471,889	$3,471,889
Pacific	$0	$0	$343,188	$0	$343,188	$343,188
Southern	$0	$0	$5,921,221	$0	$5,921,221	$5,921,221
Western	$0	$0	$2,451,199	$0	$2,451,199	$2,451,199
Subtotal	**$0**	**$0**	**$14,646,720**	**$0**	**$14,646,720**	**$14,646,720**
Construction						
Alaskan	$0	$0	$7	$0	$7	$7
Central	$0	$0	$1,828,198	$0	$1,828,198	$1,828,198

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$2,533,833	$0	$2,533,833	$2,533,833
Pacific	$0	$0	$222,954	$0	$222,954	$222,954
Southern	$0	$0	$4,123,445	$0	$4,123,445	$4,123,445
Western	$0	$0	$1,027,254	$0	$1,027,254	$1,027,254
Subtotal	**$0**	**$0**	**$9,735,691**	**$0**	**$9,735,691**	**$9,735,691**
Drycleaning and Commercial Laundries						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$35,160	$0	$35,160	$35,160
Eastern	$0	$0	$59,609	$0	$59,609	$59,609
Pacific	$0	$0	$6,222	$0	$6,222	$6,222
Southern	$0	$0	$83,456	$0	$83,456	$83,456
Western	$0	$0	$36,894	$0	$36,894	$36,894
Subtotal	**$0**	**$0**	**$221,342**	**$0**	**$221,342**	**$221,342**
Landscaping and Facilities Support						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$227,016	$0	$227,016	$227,016
Eastern	$0	$0	$346,329	$0	$346,329	$346,329
Pacific	$0	$0	$30,706	$0	$30,706	$30,706
Southern	$0	$0	$504,064	$0	$504,064	$504,064
Western	$0	$0	$266,057	$0	$266,057	$266,057
Subtotal	**$0**	**$0**	**$1,374,173**	**$0**	**$1,374,173**	**$1,374,173**
Maintenance and Repair						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$271,890	$0	$271,890	$271,890
Eastern	$0	$0	$332,610	$0	$332,610	$332,610
Pacific	$0	$0	$18,859	$0	$18,859	$18,859
Southern	$0	$0	$542,961	$0	$542,961	$542,961
Western	$0	$0	$237,715	$0	$237,715	$237,715

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$0**	**$0**	**$1,404,036**	**$0**	**$1,404,036**	**$1,404,036**
Manufacturing						
Alaskan	$0	$0	$2	$0	$2	$2
Central	$0	$0	$2,361,334	$0	$2,361,334	$2,361,334
Eastern	$0	$0	$2,209,292	$0	$2,209,292	$2,209,292
Pacific	$0	$0	$29,010	$0	$29,010	$29,010
Southern	$0	$0	$2,797,246	$0	$2,797,246	$2,797,246
Western	$0	$0	$1,073,345	$0	$1,073,345	$1,073,345
Subtotal	**$0**	**$0**	**$8,470,228**	**$0**	**$8,470,228**	**$8,470,228**
Oil and Gas						
Alaskan	$0	$0	$2	$0	$2	$2
Central	$0	$0	$53,570	$0	$53,570	$53,570
Eastern	$0	$0	$31,858	$0	$31,858	$31,858
Southern	$0	$0	$486,559	$0	$486,559	$486,559
Western	$0	$0	$31,794	$0	$31,794	$31,794
Subtotal	**$0**	**$0**	**$603,784**	**$0**	**$603,784**	**$603,784**
Postal and Delivery Services						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$98,673	$0	$98,673	$98,673
Eastern	$0	$0	$147,574	$0	$147,574	$147,574
Pacific	$0	$0	$6,848	$0	$6,848	$6,848
Southern	$0	$0	$193,367	$0	$193,367	$193,367
Western	$0	$0	$94,004	$0	$94,004	$94,004
Subtotal	**$0**	**$0**	**$540,465**	**$0**	**$540,465**	**$540,465**
Recreation and Amusement						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$211,899	$0	$211,899	$211,899
Eastern	$0	$0	$333,853	$0	$333,853	$333,853

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$20,233	$0	$20,233	$20,233
Southern	$0	$0	$540,964	$0	$540,964	$540,964
Western	$0	$0	$252,184	$0	$252,184	$252,184
Subtotal	**$0**	**$0**	**$1,359,134**	**$0**	**$1,359,134**	**$1,359,134**
Sanitation and Waste Removal						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$24,083	$0	$24,083	$24,083
Eastern	$0	$0	$36,457	$0	$36,457	$36,457
Pacific	$0	$0	$3,068	$0	$3,068	$3,068
Southern	$0	$0	$51,809	$0	$51,809	$51,809
Western	$0	$0	$23,188	$0	$23,188	$23,188
Subtotal	**$0**	**$0**	**$138,605**	**$0**	**$138,605**	**$138,605**
Telecommunications						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$73,774	$0	$73,774	$73,774
Eastern	$0	$0	$102,236	$0	$102,236	$102,236
Pacific	$0	$0	$5,728	$0	$5,728	$5,728
Southern	$0	$0	$156,530	$0	$156,530	$156,530
Western	$0	$0	$60,813	$0	$60,813	$60,813
Subtotal	**$0**	**$0**	**$399,081**	**$0**	**$399,081**	**$399,081**
Temporary Help Services						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$545,638	$0	$545,638	$545,638
Eastern	$0	$0	$675,623	$0	$675,623	$675,623
Pacific	$0	$0	$72,247	$0	$72,247	$72,247
Southern	$0	$0	$2,047,160	$0	$2,047,160	$2,047,160
Western	$0	$0	$635,109	$0	$635,109	$635,109
Subtotal	**$0**	**$0**	**$3,975,776**	**$0**	**$3,975,776**	**$3,975,776**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Transportation						
Alaskan	$0	$0	$2	$0	$2	$2
Central	$0	$0	$349,275	$0	$349,275	$349,275
Eastern	$0	$0	$340,221	$0	$340,221	$340,221
Pacific	$0	$0	$52,048	$0	$52,048	$52,048
Southern	$0	$0	$797,648	$0	$797,648	$797,648
Western	$0	$0	$198,447	$0	$198,447	$198,447
Subtotal	**$0**	**$0**	**$1,737,639**	**$0**	**$1,737,639**	**$1,737,639**
Utilities						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$186,352	$0	$186,352	$186,352
Eastern	$0	$0	$250,671	$0	$250,671	$250,671
Pacific	$0	$0	$4,646	$0	$4,646	$4,646
Southern	$0	$0	$376,360	$0	$376,360	$376,360
Western	$0	$0	$123,487	$0	$123,487	$123,487
Subtotal	**$0**	**$0**	**$941,515**	**$0**	**$941,515**	**$941,515**
Warehousing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$194,963	$0	$194,963	$194,963
Eastern	$0	$0	$272,889	$0	$272,889	$272,889
Pacific	$0	$0	$5,083	$0	$5,083	$5,083
Southern	$0	$0	$380,156	$0	$380,156	$380,156
Western	$0	$0	$181,486	$0	$181,486	$181,486
Subtotal	**$0**	**$0**	**$1,034,577**	**$0**	**$1,034,577**	**$1,034,577**
Non-Core						
Alaskan	$0	$0	$32	$0	$32	$32
Central	$0	$0	$11,211,606	$0	$11,211,606	$11,211,606
Eastern	$0	$0	$17,218,995	$0	$17,218,995	$17,218,995

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$1,136,938	$0	$1,136,938	$1,136,938
Southern	$0	$0	$19,641,718	$0	$19,641,718	$19,641,718
Western	$0	$0	$11,524,405	$0	$11,524,405	$11,524,405
Subtotal	**$0**	**$0**	**$60,733,695**	**$0**	**$60,733,695**	**$60,733,695**
Total Costs for New Indoor Employee Acclimatization						
Alaskan	$0	$0	$56	$0	$56	$56
Central	$0	$0	$20,526,989	$0	$20,526,989	$20,526,989
Eastern	$0	$0	$28,710,726	$0	$28,710,726	$28,710,726
Pacific	$0	$0	$1,980,487	$0	$1,980,487	$1,980,487
Southern	$0	$0	$39,324,858	$0	$39,324,858	$39,324,858
Western	$0	$0	$18,474,699	$0	$18,474,699	$18,474,699
Total	**$0**	**$0**	**$109,017,815**	**$0**	**$109,017,815**	**$109,017,815**
New Outdoor Employee Acclimatization						
Agriculture, Forestry, and Fishing						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$555,498	$0	$555,498	$555,498
Eastern	$0	$0	$345,783	$0	$345,783	$345,783
Pacific	$0	$0	$16,128	$0	$16,128	$16,128
Southern	$0	$0	$849,910	$0	$849,910	$849,910
Western	$0	$0	$260,886	$0	$260,886	$260,886
Subtotal	**$0**	**$0**	**$2,028,206**	**$0**	**$2,028,206**	**$2,028,206**
Building Materials and Equipment Suppliers						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$116,270	$0	$116,270	$116,270
Eastern	$0	$0	$133,667	$0	$133,667	$133,667
Pacific	$0	$0	$10,037	$0	$10,037	$10,037
Southern	$0	$0	$236,477	$0	$236,477	$236,477
Western	$0	$0	$100,700	$0	$100,700	$100,700

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$0**	**$0**	**$597,153**	**$0**	**$597,153**	**$597,153**
Commercial Kitchens						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$237,085	$0	$237,085	$237,085
Eastern	$0	$0	$333,855	$0	$333,855	$333,855
Pacific	$0	$0	$32,738	$0	$32,738	$32,738
Southern	$0	$0	$556,756	$0	$556,756	$556,756
Western	$0	$0	$233,410	$0	$233,410	$233,410
Subtotal	**$0**	**$0**	**$1,393,844**	**$0**	**$1,393,844**	**$1,393,844**
Construction						
Alaskan	$0	$0	$12	$0	$12	$12
Central	$0	$0	$3,377,743	$0	$3,377,743	$3,377,743
Eastern	$0	$0	$4,623,309	$0	$4,623,309	$4,623,309
Pacific	$0	$0	$427,668	$0	$427,668	$427,668
Southern	$0	$0	$7,682,911	$0	$7,682,911	$7,682,911
Western	$0	$0	$1,736,798	$0	$1,736,798	$1,736,798
Subtotal	**$0**	**$0**	**$17,848,441**	**$0**	**$17,848,441**	**$17,848,441**
Drycleaning and Commercial Laundries						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$11,476	$0	$11,476	$11,476
Eastern	$0	$0	$19,456	$0	$19,456	$19,456
Pacific	$0	$0	$2,031	$0	$2,031	$2,031
Southern	$0	$0	$27,240	$0	$27,240	$27,240
Western	$0	$0	$12,042	$0	$12,042	$12,042
Subtotal	**$0**	**$0**	**$72,246**	**$0**	**$72,246**	**$72,246**
Landscaping and Facilities Support						
Alaskan	$0	$0	$2	$0	$2	$2
Central	$0	$0	$507,726	$0	$507,726	$507,726

Disclaimer: This proposed rule has been submitted to the Office of the Federal Register (OFR) for publication, and is currently pending placement on public inspection at the OFR and publication in the Federal Register. This draft version of the proposed rule may vary slightly from the published document if minor technical or formatting changes are made during the OFR review process. Only the version published in the Federal Register is the official proposed rule.

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$773,553	$0	$773,553	$773,553
Pacific	$0	$0	$71,873	$0	$71,873	$71,873
Southern	$0	$0	$1,125,493	$0	$1,125,493	$1,125,493
Western	$0	$0	$610,538	$0	$610,538	$610,538
Subtotal	**$0**	**$0**	**$3,089,185**	**$0**	**$3,089,185**	**$3,089,185**
Maintenance and Repair						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$222,942	$0	$222,942	$222,942
Eastern	$0	$0	$273,945	$0	$273,945	$273,945
Pacific	$0	$0	$15,795	$0	$15,795	$15,795
Southern	$0	$0	$438,537	$0	$438,537	$438,537
Western	$0	$0	$197,862	$0	$197,862	$197,862
Subtotal	**$0**	**$0**	**$1,149,081**	**$0**	**$1,149,081**	**$1,149,081**
Manufacturing						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$529,914	$0	$529,914	$529,914
Eastern	$0	$0	$516,810	$0	$516,810	$516,810
Pacific	$0	$0	$8,812	$0	$8,812	$8,812
Southern	$0	$0	$711,140	$0	$711,140	$711,140
Western	$0	$0	$261,112	$0	$261,112	$261,112
Subtotal	**$0**	**$0**	**$2,027,789**	**$0**	**$2,027,789**	**$2,027,789**
Oil and Gas						
Alaskan	$0	$0	$4	$0	$4	$4
Central	$0	$0	$95,998	$0	$95,998	$95,998
Eastern	$0	$0	$57,257	$0	$57,257	$57,257
Southern	$0	$0	$890,293	$0	$890,293	$890,293
Western	$0	$0	$58,298	$0	$58,298	$58,298
Subtotal	**$0**	**$0**	**$1,101,849**	**$0**	**$1,101,849**	**$1,101,849**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Postal and Delivery Services						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$80,470	$0	$80,470	$80,470
Eastern	$0	$0	$119,456	$0	$119,456	$119,456
Pacific	$0	$0	$5,817	$0	$5,817	$5,817
Southern	$0	$0	$156,028	$0	$156,028	$156,028
Western	$0	$0	$73,827	$0	$73,827	$73,827
Subtotal	**$0**	**$0**	**$435,598**	**$0**	**$435,598**	**$435,598**
Recreation and Amusement						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$288,790	$0	$288,790	$288,790
Eastern	$0	$0	$455,142	$0	$455,142	$455,142
Pacific	$0	$0	$27,480	$0	$27,480	$27,480
Southern	$0	$0	$733,313	$0	$733,313	$733,313
Western	$0	$0	$342,375	$0	$342,375	$342,375
Subtotal	**$0**	**$0**	**$1,847,101**	**$0**	**$1,847,101**	**$1,847,101**
Sanitation and Waste Removal						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$28,326	$0	$28,326	$28,326
Eastern	$0	$0	$45,492	$0	$45,492	$45,492
Pacific	$0	$0	$3,910	$0	$3,910	$3,910
Southern	$0	$0	$63,700	$0	$63,700	$63,700
Western	$0	$0	$28,103	$0	$28,103	$28,103
Subtotal	**$0**	**$0**	**$169,531**	**$0**	**$169,531**	**$169,531**
Telecommunications						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$61,192	$0	$61,192	$61,192
Eastern	$0	$0	$84,800	$0	$84,800	$84,800

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$4,751	$0	$4,751	$4,751
Southern	$0	$0	$129,833	$0	$129,833	$129,833
Western	$0	$0	$50,442	$0	$50,442	$50,442
Subtotal	**$0**	**$0**	**$331,018**	**$0**	**$331,018**	**$331,018**
Temporary Help Services						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$278,149	$0	$278,149	$278,149
Eastern	$0	$0	$344,411	$0	$344,411	$344,411
Pacific	$0	$0	$36,829	$0	$36,829	$36,829
Southern	$0	$0	$1,043,577	$0	$1,043,577	$1,043,577
Western	$0	$0	$323,758	$0	$323,758	$323,758
Subtotal	**$0**	**$0**	**$2,026,725**	**$0**	**$2,026,725**	**$2,026,725**
Transportation						
Alaskan	$0	$0	$3	$0	$3	$3
Central	$0	$0	$456,381	$0	$456,381	$456,381
Eastern	$0	$0	$436,573	$0	$436,573	$436,573
Pacific	$0	$0	$69,357	$0	$69,357	$69,357
Southern	$0	$0	$1,035,820	$0	$1,035,820	$1,035,820
Western	$0	$0	$256,606	$0	$256,606	$256,606
Subtotal	**$0**	**$0**	**$2,254,740**	**$0**	**$2,254,740**	**$2,254,740**
Utilities						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$257,850	$0	$257,850	$257,850
Eastern	$0	$0	$346,941	$0	$346,941	$346,941
Pacific	$0	$0	$6,406	$0	$6,406	$6,406
Southern	$0	$0	$520,692	$0	$520,692	$520,692
Western	$0	$0	$170,610	$0	$170,610	$170,610
Subtotal	**$0**	**$0**	**$1,302,500**	**$0**	**$1,302,500**	**$1,302,500**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Warehousing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$81,507	$0	$81,507	$81,507
Eastern	$0	$0	$114,085	$0	$114,085	$114,085
Pacific	$0	$0	$2,125	$0	$2,125	$2,125
Southern	$0	$0	$158,929	$0	$158,929	$158,929
Western	$0	$0	$75,873	$0	$75,873	$75,873
Subtotal	**$0**	**$0**	**$432,519**	**$0**	**$432,519**	**$432,519**
Non-Core						
Alaskan	$0	$0	$30	$0	$30	$30
Central	$0	$0	$8,624,746	$0	$8,624,746	$8,624,746
Eastern	$0	$0	$13,666,774	$0	$13,666,774	$13,666,774
Pacific	$0	$0	$981,519	$0	$981,519	$981,519
Southern	$0	$0	$13,733,045	$0	$13,733,045	$13,733,045
Western	$0	$0	$9,513,647	$0	$9,513,647	$9,513,647
Subtotal	**$0**	**$0**	**$46,519,760**	**$0**	**$46,519,760**	**$46,519,760**
Total Costs for New Outdoor Employee Acclimatization						
Alaskan	$0	$0	$56	$0	$56	$56
Central	$0	$0	$15,812,062	$0	$15,812,062	$15,812,062
Eastern	$0	$0	$22,691,309	$0	$22,691,309	$22,691,309
Pacific	$0	$0	$1,723,276	$0	$1,723,276	$1,723,276
Southern	$0	$0	$30,093,696	$0	$30,093,696	$30,093,696
Western	$0	$0	$14,306,888	$0	$14,306,888	$14,306,888
Total	**$0**	**$0**	**$84,627,286**	**$0**	**$84,627,286**	**$84,627,286**
Returning Indoor Employee Acclimatization						
Agriculture, Forestry, and Fishing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$4,688	$0	$4,688	$4,688

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$2,865	$0	$2,865	$2,865
Pacific	$0	$0	$136	$0	$136	$136
Southern	$0	$0	$7,092	$0	$7,092	$7,092
Western	$0	$0	$6,503	$0	$6,503	$6,503
Subtotal	**$0**	**$0**	**$21,284**	**$0**	**$21,284**	**$21,284**
Building Materials and Equipment Suppliers						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$5,665	$0	$5,665	$5,665
Eastern	$0	$0	$6,911	$0	$6,911	$6,911
Pacific	$0	$0	$461	$0	$461	$461
Southern	$0	$0	$11,569	$0	$11,569	$11,569
Western	$0	$0	$5,026	$0	$5,026	$5,026
Subtotal	**$0**	**$0**	**$29,632**	**$0**	**$29,632**	**$29,632**
Commercial Kitchens						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$16,124	$0	$16,124	$16,124
Eastern	$0	$0	$22,774	$0	$22,774	$22,774
Pacific	$0	$0	$2,386	$0	$2,386	$2,386
Southern	$0	$0	$37,431	$0	$37,431	$37,431
Western	$0	$0	$16,151	$0	$16,151	$16,151
Subtotal	**$0**	**$0**	**$94,866**	**$0**	**$94,866**	**$94,866**
Construction						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$40,091	$0	$40,091	$40,091
Eastern	$0	$0	$55,085	$0	$55,085	$55,085
Pacific	$0	$0	$4,992	$0	$4,992	$4,992
Southern	$0	$0	$90,641	$0	$90,641	$90,641
Western	$0	$0	$41,364	$0	$41,364	$41,364

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$0**	**$0**	**$232,173**	**$0**	**$232,173**	**$232,173**
Drycleaning and Commercial Laundries						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$906	$0	$906	$906
Eastern	$0	$0	$1,536	$0	$1,536	$1,536
Pacific	$0	$0	$160	$0	$160	$160
Southern	$0	$0	$2,150	$0	$2,150	$2,150
Western	$0	$0	$951	$0	$951	$951
Subtotal	**$0**	**$0**	**$5,703**	**$0**	**$5,703**	**$5,703**
Landscaping and Facilities Support						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$7,457	$0	$7,457	$7,457
Eastern	$0	$0	$11,364	$0	$11,364	$11,364
Pacific	$0	$0	$990	$0	$990	$990
Southern	$0	$0	$16,560	$0	$16,560	$16,560
Western	$0	$0	$7,104	$0	$7,104	$7,104
Subtotal	**$0**	**$0**	**$43,475**	**$0**	**$43,475**	**$43,475**
Maintenance and Repair						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$7,006	$0	$7,006	$7,006
Eastern	$0	$0	$8,570	$0	$8,570	$8,570
Pacific	$0	$0	$486	$0	$486	$486
Southern	$0	$0	$13,990	$0	$13,990	$13,990
Western	$0	$0	$6,125	$0	$6,125	$6,125
Subtotal	**$0**	**$0**	**$36,177**	**$0**	**$36,177**	**$36,177**
Manufacturing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$122,175	$0	$122,175	$122,175

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$114,309	$0	$114,309	$114,309
Pacific	$0	$0	$1,501	$0	$1,501	$1,501
Southern	$0	$0	$144,730	$0	$144,730	$144,730
Western	$0	$0	$55,535	$0	$55,535	$55,535
Subtotal	**$0**	**$0**	**$438,250**	**$0**	**$438,250**	**$438,250**
Oil and Gas						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$1,123	$0	$1,123	$1,123
Eastern	$0	$0	$674	$0	$674	$674
Southern	$0	$0	$10,578	$0	$10,578	$10,578
Western	$0	$0	$781	$0	$781	$781
Subtotal	**$0**	**$0**	**$13,157**	**$0**	**$13,157**	**$13,157**
Postal and Delivery Services						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$1,822	$0	$1,822	$1,822
Eastern	$0	$0	$2,724	$0	$2,724	$2,724
Pacific	$0	$0	$126	$0	$126	$126
Southern	$0	$0	$3,570	$0	$3,570	$3,570
Western	$0	$0	$1,735	$0	$1,735	$1,735
Subtotal	**$0**	**$0**	**$9,978**	**$0**	**$9,978**	**$9,978**
Recreation and Amusement						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$942	$0	$942	$942
Eastern	$0	$0	$1,484	$0	$1,484	$1,484
Pacific	$0	$0	$89	$0	$89	$89
Southern	$0	$0	$2,404	$0	$2,404	$2,404
Western	$0	$0	$1,122	$0	$1,122	$1,122
Subtotal	**$0**	**$0**	**$6,041**	**$0**	**$6,041**	**$6,041**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Sanitation and Waste Removal						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$827	$0	$827	$827
Eastern	$0	$0	$1,252	$0	$1,252	$1,252
Pacific	$0	$0	$105	$0	$105	$105
Southern	$0	$0	$1,780	$0	$1,780	$1,780
Western	$0	$0	$796	$0	$796	$796
Subtotal	**$0**	**$0**	**$4,761**	**$0**	**$4,761**	**$4,761**
Telecommunications						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$3,492	$0	$3,492	$3,492
Eastern	$0	$0	$4,840	$0	$4,840	$4,840
Pacific	$0	$0	$271	$0	$271	$271
Southern	$0	$0	$7,410	$0	$7,410	$7,410
Western	$0	$0	$2,879	$0	$2,879	$2,879
Subtotal	**$0**	**$0**	**$18,893**	**$0**	**$18,893**	**$18,893**
Temporary Help Services						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$18,741	$0	$18,741	$18,741
Eastern	$0	$0	$23,206	$0	$23,206	$23,206
Pacific	$0	$0	$2,482	$0	$2,482	$2,482
Southern	$0	$0	$70,315	$0	$70,315	$70,315
Western	$0	$0	$21,815	$0	$21,815	$21,815
Subtotal	**$0**	**$0**	**$136,559**	**$0**	**$136,559**	**$136,559**
Transportation						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$6,448	$0	$6,448	$6,448
Eastern	$0	$0	$6,281	$0	$6,281	$6,281

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$961	$0	$961	$961
Southern	$0	$0	$14,726	$0	$14,726	$14,726
Western	$0	$0	$5,045	$0	$5,045	$5,045
Subtotal	**$0**	**$0**	**$33,461**	**$0**	**$33,461**	**$33,461**
Utilities						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$4,482	$0	$4,482	$4,482
Eastern	$0	$0	$6,029	$0	$6,029	$6,029
Pacific	$0	$0	$112	$0	$112	$112
Southern	$0	$0	$9,053	$0	$9,053	$9,053
Western	$0	$0	$2,970	$0	$2,970	$2,970
Subtotal	**$0**	**$0**	**$22,646**	**$0**	**$22,646**	**$22,646**
Warehousing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$3,599	$0	$3,599	$3,599
Eastern	$0	$0	$5,038	$0	$5,038	$5,038
Pacific	$0	$0	$94	$0	$94	$94
Southern	$0	$0	$7,018	$0	$7,018	$7,018
Western	$0	$0	$3,351	$0	$3,351	$3,351
Subtotal	**$0**	**$0**	**$19,100**	**$0**	**$19,100**	**$19,100**
Non-Core						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$374,077	$0	$374,077	$374,077
Eastern	$0	$0	$578,128	$0	$578,128	$578,128
Pacific	$0	$0	$35,713	$0	$35,713	$35,713
Southern	$0	$0	$545,004	$0	$545,004	$545,004
Western	$0	$0	$407,593	$0	$407,593	$407,593
Subtotal	**$0**	**$0**	**$1,940,516**	**$0**	**$1,940,516**	**$1,940,516**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Total Costs for Returning Indoor Employee Acclimatization						
Alaskan	$0	$0	$2	$0	$2	$2
Central	$0	$0	$619,667	$0	$619,667	$619,667
Eastern	$0	$0	$853,071	$0	$853,071	$853,071
Pacific	$0	$0	$51,065	$0	$51,065	$51,065
Southern	$0	$0	$996,021	$0	$996,021	$996,021
Western	$0	$0	$586,847	$0	$586,847	$586,847
Total	**$0**	**$0**	**$3,106,673**	**$0**	**$3,106,673**	**$3,106,673**
Returning Outdoor Employee Acclimatization						
Agriculture, Forestry, and Fishing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$13,470	$0	$13,470	$13,470
Eastern	$0	$0	$8,384	$0	$8,384	$8,384
Pacific	$0	$0	$391	$0	$391	$391
Southern	$0	$0	$20,608	$0	$20,608	$20,608
Western	$0	$0	$18,563	$0	$18,563	$18,563
Subtotal	**$0**	**$0**	**$61,417**	**$0**	**$61,417**	**$61,417**
Building Materials and Equipment Suppliers						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$3,401	$0	$3,401	$3,401
Eastern	$0	$0	$4,165	$0	$4,165	$4,165
Pacific	$0	$0	$282	$0	$282	$282
Southern	$0	$0	$7,291	$0	$7,291	$7,291
Western	$0	$0	$3,127	$0	$3,127	$3,127
Subtotal	**$0**	**$0**	**$18,266**	**$0**	**$18,266**	**$18,266**
Commercial Kitchens						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$1,652	$0	$1,652	$1,652

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$2,329	$0	$2,329	$2,329
Pacific	$0	$0	$247	$0	$247	$247
Southern	$0	$0	$3,706	$0	$3,706	$3,706
Western	$0	$0	$1,641	$0	$1,641	$1,641
Subtotal	**$0**	**$0**	**$9,576**	**$0**	**$9,576**	**$9,576**
Construction						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$76,776	$0	$76,776	$76,776
Eastern	$0	$0	$104,503	$0	$104,503	$104,503
Pacific	$0	$0	$9,850	$0	$9,850	$9,850
Southern	$0	$0	$174,940	$0	$174,940	$174,940
Western	$0	$0	$80,015	$0	$80,015	$80,015
Subtotal	**$0**	**$0**	**$446,085**	**$0**	**$446,085**	**$446,085**
Drycleaning and Commercial Laundries						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$296	$0	$296	$296
Eastern	$0	$0	$501	$0	$501	$501
Pacific	$0	$0	$52	$0	$52	$52
Southern	$0	$0	$702	$0	$702	$702
Western	$0	$0	$310	$0	$310	$310
Subtotal	**$0**	**$0**	**$1,862**	**$0**	**$1,862**	**$1,862**
Landscaping and Facilities Support						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$16,658	$0	$16,658	$16,658
Eastern	$0	$0	$25,377	$0	$25,377	$25,377
Pacific	$0	$0	$2,343	$0	$2,343	$2,343
Southern	$0	$0	$37,002	$0	$37,002	$37,002
Western	$0	$0	$15,747	$0	$15,747	$15,747

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$0**	**$0**	**$97,128**	**$0**	**$97,128**	**$97,128**
Maintenance and Repair						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$5,744	$0	$5,744	$5,744
Eastern	$0	$0	$7,059	$0	$7,059	$7,059
Pacific	$0	$0	$407	$0	$407	$407
Southern	$0	$0	$11,300	$0	$11,300	$11,300
Western	$0	$0	$5,098	$0	$5,098	$5,098
Subtotal	**$0**	**$0**	**$29,608**	**$0**	**$29,608**	**$29,608**
Manufacturing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$27,418	$0	$27,418	$27,418
Eastern	$0	$0	$26,740	$0	$26,740	$26,740
Pacific	$0	$0	$456	$0	$456	$456
Southern	$0	$0	$36,794	$0	$36,794	$36,794
Western	$0	$0	$13,510	$0	$13,510	$13,510
Subtotal	**$0**	**$0**	**$104,918**	**$0**	**$104,918**	**$104,918**
Oil and Gas						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$2,029	$0	$2,029	$2,029
Eastern	$0	$0	$1,221	$0	$1,221	$1,221
Southern	$0	$0	$19,469	$0	$19,469	$19,469
Western	$0	$0	$1,434	$0	$1,434	$1,434
Subtotal	**$0**	**$0**	**$24,153**	**$0**	**$24,153**	**$24,153**
Postal and Delivery Services						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$1,486	$0	$1,486	$1,486
Eastern	$0	$0	$2,205	$0	$2,205	$2,205

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Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$107	$0	$107	$107
Southern	$0	$0	$2,881	$0	$2,881	$2,881
Western	$0	$0	$1,363	$0	$1,363	$1,363
Subtotal	**$0**	**$0**	**$8,042**	**$0**	**$8,042**	**$8,042**
Recreation and Amusement						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$1,284	$0	$1,284	$1,284
Eastern	$0	$0	$2,024	$0	$2,024	$2,024
Pacific	$0	$0	$121	$0	$121	$121
Southern	$0	$0	$3,259	$0	$3,259	$3,259
Western	$0	$0	$1,524	$0	$1,524	$1,524
Subtotal	**$0**	**$0**	**$8,213**	**$0**	**$8,213**	**$8,213**
Sanitation and Waste Removal						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$973	$0	$973	$973
Eastern	$0	$0	$1,563	$0	$1,563	$1,563
Pacific	$0	$0	$134	$0	$134	$134
Southern	$0	$0	$2,188	$0	$2,188	$2,188
Western	$0	$0	$965	$0	$965	$965
Subtotal	**$0**	**$0**	**$5,823**	**$0**	**$5,823**	**$5,823**
Telecommunications						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$2,897	$0	$2,897	$2,897
Eastern	$0	$0	$4,014	$0	$4,014	$4,014
Pacific	$0	$0	$225	$0	$225	$225
Southern	$0	$0	$6,146	$0	$6,146	$6,146
Western	$0	$0	$2,388	$0	$2,388	$2,388
Subtotal	**$0**	**$0**	**$15,670**	**$0**	**$15,670**	**$15,670**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Temporary Help Services						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$9,554	$0	$9,554	$9,554
Eastern	$0	$0	$11,830	$0	$11,830	$11,830
Pacific	$0	$0	$1,265	$0	$1,265	$1,265
Southern	$0	$0	$35,845	$0	$35,845	$35,845
Western	$0	$0	$11,120	$0	$11,120	$11,120
Subtotal	**$0**	**$0**	**$69,614**	**$0**	**$69,614**	**$69,614**
Transportation						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$8,425	$0	$8,425	$8,425
Eastern	$0	$0	$8,060	$0	$8,060	$8,060
Pacific	$0	$0	$1,280	$0	$1,280	$1,280
Southern	$0	$0	$19,123	$0	$19,123	$19,123
Western	$0	$0	$6,496	$0	$6,496	$6,496
Subtotal	**$0**	**$0**	**$43,384**	**$0**	**$43,384**	**$43,384**
Utilities						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$6,202	$0	$6,202	$6,202
Eastern	$0	$0	$8,345	$0	$8,345	$8,345
Pacific	$0	$0	$154	$0	$154	$154
Southern	$0	$0	$12,524	$0	$12,524	$12,524
Western	$0	$0	$4,104	$0	$4,104	$4,104
Subtotal	**$0**	**$0**	**$31,329**	**$0**	**$31,329**	**$31,329**
Warehousing						
Alaskan	$0	$0	$0	$0	$0	$0
Central	$0	$0	$1,505	$0	$1,505	$1,505
Eastern	$0	$0	$2,106	$0	$2,106	$2,106

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Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$39	$0	$39	$39
Southern	$0	$0	$2,934	$0	$2,934	$2,934
Western	$0	$0	$1,401	$0	$1,401	$1,401
Subtotal	**$0**	**$0**	**$7,985**	**$0**	**$7,985**	**$7,985**
Non-Core						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$333,854	$0	$333,854	$333,854
Eastern	$0	$0	$542,408	$0	$542,408	$542,408
Pacific	$0	$0	$35,984	$0	$35,984	$35,984
Southern	$0	$0	$394,771	$0	$394,771	$394,771
Western	$0	$0	$406,653	$0	$406,653	$406,653
Subtotal	**$0**	**$0**	**$1,713,672**	**$0**	**$1,713,672**	**$1,713,672**
Total Costs for Returning Outdoor Employee Acclimatization						
Alaskan	$0	$0	$2	$0	$2	$2
Central	$0	$0	$513,623	$0	$513,623	$513,623
Eastern	$0	$0	$762,835	$0	$762,835	$762,835
Pacific	$0	$0	$53,340	$0	$53,340	$53,340
Southern	$0	$0	$791,484	$0	$791,484	$791,484
Western	$0	$0	$575,460	$0	$575,460	$575,460
Total	**$0**	**$0**	**$2,696,744**	**$0**	**$2,696,744**	**$2,696,744**
Rest Breaks at Initial Heat Trigger – Indoor						
Agriculture, Forestry, and Fishing						
Alaskan	$0	$0	$8	$2	$6	$6
Central	$0	$0	$494,281	$115,332	$378,949	$378,949
Eastern	$0	$0	$285,957	$66,723	$219,234	$219,234
Pacific	$0	$0	$15,605	$3,641	$11,964	$11,964
Southern	$0	$0	$795,586	$185,637	$609,949	$609,949
Western	$0	$0	$661,911	$154,446	$507,465	$507,465

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$0**	**$0**	**$2,253,348**	**$525,781**	**$1,727,567**	**$1,727,567**
Building Materials and Equipment Suppliers						
Alaskan	$0	$0	$30	$7	$23	$23
Central	$0	$0	$542,090	$126,488	$415,602	$415,602
Eastern	$0	$0	$654,987	$152,830	$502,157	$502,157
Pacific	$0	$0	$48,716	$11,367	$37,349	$37,349
Southern	$0	$0	$1,259,531	$293,891	$965,641	$965,641
Western	$0	$0	$489,137	$114,132	$375,005	$375,005
Subtotal	**$0**	**$0**	**$2,994,491**	**$698,714**	**$2,295,776**	**$2,295,776**
Commercial Kitchens						
Alaskan	$0	$0	$73	$17	$56	$56
Central	$0	$0	$1,857,283	$433,366	$1,423,917	$1,423,917
Eastern	$0	$0	$2,613,642	$609,850	$2,003,792	$2,003,792
Pacific	$0	$0	$436,216	$101,784	$334,433	$334,433
Southern	$0	$0	$5,793,449	$1,351,805	$4,441,644	$4,441,644
Western	$0	$0	$1,917,574	$447,434	$1,470,140	$1,470,140
Subtotal	**$0**	**$0**	**$12,618,237**	**$2,944,255**	**$9,673,982**	**$9,673,982**
Construction						
Alaskan	$0	$0	$246	$57	$189	$189
Central	$0	$0	$3,219,194	$751,145	$2,468,049	$2,468,049
Eastern	$0	$0	$4,443,035	$1,036,708	$3,406,327	$3,406,327
Pacific	$0	$0	$502,541	$117,260	$385,282	$385,282
Southern	$0	$0	$8,615,101	$2,010,190	$6,604,911	$6,604,911
Western	$0	$0	$3,402,628	$793,947	$2,608,682	$2,608,682
Subtotal	**$0**	**$0**	**$20,182,745**	**$4,709,307**	**$15,473,438**	**$15,473,438**
Drycleaning and Commercial Laundries						
Alaskan	$0	$0	$4	$1	$3	$3
Central	$0	$0	$87,222	$20,352	$66,870	$66,870

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Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$147,275	$34,364	$112,911	$112,911
Pacific	$0	$0	$17,020	$3,971	$13,048	$13,048
Southern	$0	$0	$239,057	$55,780	$183,277	$183,277
Western	$0	$0	$92,951	$21,689	$71,263	$71,263
Subtotal	**$0**	**$0**	**$583,529**	**$136,157**	**$447,372**	**$447,372**
Landscaping and Facilities Support						
Alaskan	$0	$0	$75	$17	$57	$57
Central	$0	$0	$705,904	$164,711	$541,193	$541,193
Eastern	$0	$0	$1,087,767	$253,812	$833,955	$833,955
Pacific	$0	$0	$99,076	$23,118	$75,959	$75,959
Southern	$0	$0	$1,798,521	$419,655	$1,378,866	$1,378,866
Western	$0	$0	$685,161	$159,871	$525,290	$525,290
Subtotal	**$0**	**$0**	**$4,376,505**	**$1,021,184**	**$3,355,320**	**$3,355,320**
Maintenance and Repair						
Alaskan	$0	$0	$34	$8	$26	$26
Central	$0	$0	$675,747	$157,674	$518,072	$518,072
Eastern	$0	$0	$834,797	$194,786	$640,011	$640,011
Pacific	$0	$0	$52,772	$12,313	$40,458	$40,458
Southern	$0	$0	$1,556,716	$363,234	$1,193,482	$1,193,482
Western	$0	$0	$608,916	$142,080	$466,836	$466,836
Subtotal	**$0**	**$0**	**$3,728,982**	**$870,096**	**$2,858,886**	**$2,858,886**
Manufacturing						
Alaskan	$0	$0	$143	$33	$110	$110
Central	$0	$0	$8,513,706	$1,986,531	$6,527,175	$6,527,175
Eastern	$0	$0	$8,181,403	$1,908,994	$6,272,409	$6,272,409
Pacific	$0	$0	$107,956	$25,190	$82,766	$82,766
Southern	$0	$0	$11,413,732	$2,663,204	$8,750,528	$8,750,528
Western	$0	$0	$4,062,091	$947,821	$3,114,270	$3,114,270

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$0**	**$0**	**$32,279,030**	**$7,531,774**	**$24,747,257**	**$24,747,257**
Oil and Gas						
Alaskan	$0	$0	$86	$20	$66	$66
Central	$0	$0	$113,630	$26,514	$87,116	$87,116
Eastern	$0	$0	$64,273	$14,997	$49,276	$49,276
Southern	$0	$0	$1,170,506	$273,118	$897,388	$897,388
Western	$0	$0	$77,990	$18,198	$59,792	$59,792
Subtotal	**$0**	**$0**	**$1,426,485**	**$332,846**	**$1,093,638**	**$1,093,638**
Postal and Delivery Services						
Alaskan	$0	$0	$5	$1	$4	$4
Central	$0	$0	$181,573	$42,367	$139,206	$139,206
Eastern	$0	$0	$269,273	$62,830	$206,442	$206,442
Pacific	$0	$0	$14,502	$3,384	$11,118	$11,118
Southern	$0	$0	$418,102	$97,557	$320,545	$320,545
Western	$0	$0	$177,024	$41,306	$135,719	$135,719
Subtotal	**$0**	**$0**	**$1,060,480**	**$247,445**	**$813,034**	**$813,034**
Recreation and Amusement						
Alaskan	$0	$0	$6	$1	$4	$4
Central	$0	$0	$125,999	$29,400	$96,599	$96,599
Eastern	$0	$0	$194,885	$45,473	$149,412	$149,412
Pacific	$0	$0	$22,307	$5,205	$17,102	$17,102
Southern	$0	$0	$456,939	$106,619	$350,320	$350,320
Western	$0	$0	$153,737	$35,872	$117,865	$117,865
Subtotal	**$0**	**$0**	**$953,872**	**$222,570**	**$731,302**	**$731,302**
Sanitation and Waste Removal						
Alaskan	$0	$0	$13	$3	$10	$10
Central	$0	$0	$78,193	$18,245	$59,948	$59,948
Eastern	$0	$0	$117,476	$27,411	$90,065	$90,065

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$10,513	$2,453	$8,060	$8,060
Southern	$0	$0	$191,472	$44,677	$146,795	$146,795
Western	$0	$0	$77,662	$18,121	$59,541	$59,541
Subtotal	**$0**	**$0**	**$475,329**	**$110,910**	**$364,419**	**$364,419**
Telecommunications						
Alaskan	$0	$0	$35	$8	$27	$27
Central	$0	$0	$326,875	$76,271	$250,604	$250,604
Eastern	$0	$0	$451,879	$105,439	$346,441	$346,441
Pacific	$0	$0	$24,069	$5,616	$18,453	$18,453
Southern	$0	$0	$773,027	$180,373	$592,654	$592,654
Western	$0	$0	$274,288	$64,001	$210,288	$210,288
Subtotal	**$0**	**$0**	**$1,850,175**	**$431,707**	**$1,418,467**	**$1,418,467**
Temporary Help Services						
Alaskan	$0	$0	$11	$2	$8	$8
Central	$0	$0	$1,764,509	$411,719	$1,352,790	$1,352,790
Eastern	$0	$0	$2,223,951	$518,922	$1,705,029	$1,705,029
Pacific	$0	$0	$237,694	$55,462	$182,232	$182,232
Southern	$0	$0	$7,717,829	$1,800,827	$5,917,003	$5,917,003
Western	$0	$0	$2,078,922	$485,082	$1,593,840	$1,593,840
Subtotal	**$0**	**$0**	**$14,022,916**	**$3,272,014**	**$10,750,903**	**$10,750,903**
Transportation						
Alaskan	$0	$0	$78	$18	$60	$60
Central	$0	$0	$644,184	$150,310	$493,874	$493,874
Eastern	$0	$0	$626,041	$146,076	$479,965	$479,965
Pacific	$0	$0	$114,259	$26,660	$87,598	$87,598
Southern	$0	$0	$1,718,290	$400,934	$1,317,356	$1,317,356
Western	$0	$0	$519,628	$121,246	$398,381	$398,381
Subtotal	**$0**	**$0**	**$3,622,479**	**$845,245**	**$2,777,234**	**$2,777,234**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Utilities						
Alaskan	$0	$0	$34	$8	$26	$26
Central	$0	$0	$433,621	$101,178	$332,443	$332,443
Eastern	$0	$0	$581,993	$135,798	$446,195	$446,195
Pacific	$0	$0	$13,832	$3,228	$10,605	$10,605
Southern	$0	$0	$1,004,639	$234,416	$770,223	$770,223
Western	$0	$0	$303,370	$70,786	$232,584	$232,584
Subtotal	**$0**	**$0**	**$2,337,489**	**$545,414**	**$1,792,075**	**$1,792,075**
Warehousing						
Alaskan	$0	$0	$3	$1	$2	$2
Central	$0	$0	$359,090	$83,788	$275,302	$275,302
Eastern	$0	$0	$508,162	$118,571	$389,591	$389,591
Pacific	$0	$0	$11,186	$2,610	$8,576	$8,576
Southern	$0	$0	$810,689	$189,161	$621,528	$621,528
Western	$0	$0	$338,273	$78,930	$259,343	$259,343
Subtotal	**$0**	**$0**	**$2,027,404**	**$473,061**	**$1,554,343**	**$1,554,343**
Non-Core						
Alaskan	$0	$0	$1,385	$323	$1,062	$1,062
Central	$0	$0	$19,589,073	$4,570,784	$15,018,289	$15,018,289
Eastern	$0	$0	$30,377,960	$7,088,191	$23,289,770	$23,289,770
Pacific	$0	$0	$1,959,466	$457,209	$1,502,257	$1,502,257
Southern	$0	$0	$33,508,390	$7,818,624	$25,689,765	$25,689,765
Western	$0	$0	$21,969,623	$5,126,245	$16,843,378	$16,843,378
Subtotal	**$0**	**$0**	**$107,405,896**	**$25,061,376**	**$82,344,521**	**$82,344,521**
Total Costs for Rest Breaks at Initial Heat Trigger – Indoor						
Alaskan	$0	$0	$2,268	$529	$1,739	$1,739
Central	$0	$0	$39,712,173	$9,266,174	$30,445,999	$30,445,999
Eastern	$0	$0	$53,664,756	$12,521,777	$41,142,980	$41,142,980

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$3,687,730	$860,470	$2,827,260	$2,827,260
Southern	$0	$0	$79,241,576	$18,489,701	$60,751,875	$60,751,875
Western	$0	$0	$37,890,887	$8,841,207	$29,049,680	$29,049,680
Total	**$0**	**$0**	**$214,199,392**	**$49,979,858**	**$164,219,534**	**$164,219,534**
Rest Breaks at Initial Heat Trigger – Outdoor						
Agriculture, Forestry, and Fishing						
Alaskan	$0	$0	$26	$5	$21	$21
Central	$0	$0	$1,447,844	$289,569	$1,158,275	$1,158,275
Eastern	$0	$0	$854,788	$170,958	$683,830	$683,830
Pacific	$0	$0	$45,903	$9,181	$36,722	$36,722
Southern	$0	$0	$2,356,557	$471,311	$1,885,246	$1,885,246
Western	$0	$0	$1,932,124	$386,425	$1,545,700	$1,545,700
Subtotal	**$0**	**$0**	**$6,637,243**	**$1,327,449**	**$5,309,794**	**$5,309,794**
Building Materials and Equipment Suppliers						
Alaskan	$0	$0	$19	$4	$15	$15
Central	$0	$0	$331,125	$66,225	$264,900	$264,900
Eastern	$0	$0	$402,033	$80,407	$321,626	$321,626
Pacific	$0	$0	$30,235	$6,047	$24,188	$24,188
Southern	$0	$0	$807,047	$161,409	$645,638	$645,638
Western	$0	$0	$309,009	$61,802	$247,207	$247,207
Subtotal	**$0**	**$0**	**$1,879,467**	**$375,893**	**$1,503,574**	**$1,503,574**
Commercial Kitchens						
Alaskan	$0	$0	$8	$2	$6	$6
Central	$0	$0	$188,883	$37,777	$151,106	$151,106
Eastern	$0	$0	$264,517	$52,903	$211,613	$211,613
Pacific	$0	$0	$43,628	$8,726	$34,903	$34,903
Southern	$0	$0	$568,982	$113,796	$455,186	$455,186
Western	$0	$0	$193,195	$38,639	$154,556	$154,556

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$0**	**$0**	**$1,259,213**	**$251,843**	**$1,007,371**	**$1,007,371**
Construction						
Alaskan	$0	$0	$441	$88	$353	$353
Central	$0	$0	$6,152,988	$1,230,598	$4,922,390	$4,922,390
Eastern	$0	$0	$8,382,560	$1,676,512	$6,706,048	$6,706,048
Pacific	$0	$0	$995,358	$199,072	$796,286	$796,286
Southern	$0	$0	$16,580,548	$3,316,110	$13,264,438	$13,264,438
Western	$0	$0	$6,576,720	$1,315,344	$5,261,376	$5,261,376
Subtotal	**$0**	**$0**	**$38,688,614**	**$7,737,723**	**$30,950,891**	**$30,950,891**
Drycleaning and Commercial Laundries						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$29,041	$5,808	$23,232	$23,232
Eastern	$0	$0	$49,035	$9,807	$39,228	$39,228
Pacific	$0	$0	$5,667	$1,133	$4,533	$4,533
Southern	$0	$0	$79,594	$15,919	$63,675	$63,675
Western	$0	$0	$30,948	$6,190	$24,759	$24,759
Subtotal	**$0**	**$0**	**$194,286**	**$38,857**	**$155,429**	**$155,429**
Landscaping and Facilities Support						
Alaskan	$0	$0	$127	$25	$102	$102
Central	$0	$0	$1,609,058	$321,812	$1,287,246	$1,287,246
Eastern	$0	$0	$2,479,858	$495,972	$1,983,886	$1,983,886
Pacific	$0	$0	$239,411	$47,882	$191,529	$191,529
Southern	$0	$0	$4,100,068	$820,014	$3,280,054	$3,280,054
Western	$0	$0	$1,553,009	$310,602	$1,242,407	$1,242,407
Subtotal	**$0**	**$0**	**$9,981,530**	**$1,996,306**	**$7,985,224**	**$7,985,224**
Maintenance and Repair						
Alaskan	$0	$0	$29	$6	$23	$23
Central	$0	$0	$565,344	$113,069	$452,275	$452,275

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Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$700,860	$140,172	$560,688	$560,688
Pacific	$0	$0	$45,008	$9,002	$36,006	$36,006
Southern	$0	$0	$1,283,101	$256,620	$1,026,481	$1,026,481
Western	$0	$0	$516,573	$103,315	$413,258	$413,258
Subtotal	**$0**	**$0**	**$3,110,915**	**$622,183**	**$2,488,732**	**$2,488,732**
Manufacturing						
Alaskan	$0	$0	$51	$10	$41	$41
Central	$0	$0	$1,954,406	$390,881	$1,563,525	$1,563,525
Eastern	$0	$0	$1,956,554	$391,311	$1,565,244	$1,565,244
Pacific	$0	$0	$33,381	$6,676	$26,705	$26,705
Southern	$0	$0	$2,961,164	$592,233	$2,368,931	$2,368,931
Western	$0	$0	$1,008,707	$201,741	$806,965	$806,965
Subtotal	**$0**	**$0**	**$7,914,264**	**$1,582,853**	**$6,331,411**	**$6,331,411**
Oil and Gas						
Alaskan	$0	$0	$164	$33	$131	$131
Central	$0	$0	$209,271	$41,854	$167,417	$167,417
Eastern	$0	$0	$118,661	$23,732	$94,929	$94,929
Southern	$0	$0	$2,196,724	$439,345	$1,757,379	$1,757,379
Western	$0	$0	$145,839	$29,168	$116,671	$116,671
Subtotal	**$0**	**$0**	**$2,670,659**	**$534,132**	**$2,136,527**	**$2,136,527**
Postal and Delivery Services						
Alaskan	$0	$0	$5	$1	$4	$4
Central	$0	$0	$150,995	$30,199	$120,796	$120,796
Eastern	$0	$0	$222,509	$44,502	$178,007	$178,007
Pacific	$0	$0	$12,567	$2,513	$10,053	$10,053
Southern	$0	$0	$343,861	$68,772	$275,089	$275,089
Western	$0	$0	$141,847	$28,369	$113,478	$113,478
Subtotal	**$0**	**$0**	**$871,785**	**$174,357**	**$697,428**	**$697,428**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Recreation and Amusement						
Alaskan	$0	$0	$8	$2	$6	$6
Central	$0	$0	$175,190	$35,038	$140,152	$140,152
Eastern	$0	$0	$271,067	$54,213	$216,853	$216,853
Pacific	$0	$0	$30,901	$6,180	$24,721	$24,721
Southern	$0	$0	$631,736	$126,347	$505,389	$505,389
Western	$0	$0	$213,035	$42,607	$170,428	$170,428
Subtotal	**$0**	**$0**	**$1,321,937**	**$264,387**	**$1,057,550**	**$1,057,550**
Sanitation and Waste Removal						
Alaskan	$0	$0	$19	$4	$15	$15
Central	$0	$0	$93,862	$18,772	$75,090	$75,090
Eastern	$0	$0	$149,142	$29,828	$119,314	$119,314
Pacific	$0	$0	$13,534	$2,707	$10,827	$10,827
Southern	$0	$0	$239,950	$47,990	$191,960	$191,960
Western	$0	$0	$95,962	$19,192	$76,770	$76,770
Subtotal	**$0**	**$0**	**$592,470**	**$118,494**	**$473,976**	**$473,976**
Telecommunications						
Alaskan	$0	$0	$30	$6	$24	$24
Central	$0	$0	$276,569	$55,314	$221,255	$221,255
Eastern	$0	$0	$382,333	$76,467	$305,867	$305,867
Pacific	$0	$0	$20,365	$4,073	$16,292	$16,292
Southern	$0	$0	$654,055	$130,811	$523,244	$523,244
Western	$0	$0	$232,075	$46,415	$185,660	$185,660
Subtotal	**$0**	**$0**	**$1,565,427**	**$313,085**	**$1,252,342**	**$1,252,342**
Temporary Help Services						
Alaskan	$0	$0	$6	$1	$4	$4
Central	$0	$0	$917,544	$183,509	$734,035	$734,035
Eastern	$0	$0	$1,156,453	$231,291	$925,162	$925,162

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$123,601	$24,720	$98,881	$98,881
Southern	$0	$0	$4,013,267	$802,653	$3,210,613	$3,210,613
Western	$0	$0	$1,081,038	$216,208	$864,831	$864,831
Subtotal	**$0**	**$0**	**$7,291,908**	**$1,458,382**	**$5,833,527**	**$5,833,527**
Transportation						
Alaskan	$0	$0	$112	$22	$90	$90
Central	$0	$0	$858,719	$171,744	$686,975	$686,975
Eastern	$0	$0	$818,869	$163,774	$655,096	$655,096
Pacific	$0	$0	$154,829	$30,966	$123,863	$123,863
Southern	$0	$0	$2,274,433	$454,887	$1,819,546	$1,819,546
Western	$0	$0	$683,172	$136,634	$546,538	$546,538
Subtotal	**$0**	**$0**	**$4,790,135**	**$958,027**	**$3,832,108**	**$3,832,108**
Utilities						
Alaskan	$0	$0	$47	$9	$38	$38
Central	$0	$0	$612,027	$122,405	$489,621	$489,621
Eastern	$0	$0	$821,643	$164,329	$657,315	$657,315
Pacific	$0	$0	$19,465	$3,893	$15,572	$15,572
Southern	$0	$0	$1,417,789	$283,558	$1,134,231	$1,134,231
Western	$0	$0	$427,591	$85,518	$342,073	$342,073
Subtotal	**$0**	**$0**	**$3,298,562**	**$659,712**	**$2,638,849**	**$2,638,849**
Warehousing						
Alaskan	$0	$0	$1	$0	$1	$1
Central	$0	$0	$153,135	$30,627	$122,508	$122,508
Eastern	$0	$0	$216,708	$43,342	$173,366	$173,366
Pacific	$0	$0	$4,770	$954	$3,816	$3,816
Southern	$0	$0	$345,721	$69,144	$276,577	$276,577
Western	$0	$0	$144,258	$28,852	$115,406	$115,406
Subtotal	**$0**	**$0**	**$864,594**	**$172,919**	**$691,675**	**$691,675**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Non-Core						
Alaskan	$0	$0	$1,602	$320	$1,282	$1,282
Central	$0	$0	$17,577,924	$3,515,585	$14,062,339	$14,062,339
Eastern	$0	$0	$28,801,093	$5,760,219	$23,040,875	$23,040,875
Pacific	$0	$0	$1,933,219	$386,644	$1,546,575	$1,546,575
Southern	$0	$0	$24,553,870	$4,910,774	$19,643,096	$19,643,096
Western	$0	$0	$22,012,012	$4,402,402	$17,609,610	$17,609,610
Subtotal	**$0**	**$0**	**$94,879,721**	**$18,975,944**	**$75,903,777**	**$75,903,777**
Total Costs for Rest Breaks at Initial Heat Trigger – Outdoor						
Alaskan	$0	$0	$2,698	$540	$2,158	$2,158
Central	$0	$0	$33,303,923	$6,660,785	$26,643,138	$26,643,138
Eastern	$0	$0	$48,048,684	$9,609,737	$38,438,947	$38,438,947
Pacific	$0	$0	$3,751,841	$750,368	$3,001,473	$3,001,473
Southern	$0	$0	$65,408,469	$13,081,694	$52,326,776	$52,326,776
Western	$0	$0	$37,297,115	$7,459,423	$29,837,692	$29,837,692
Total	**$0**	**$0**	**$187,812,730**	**$37,562,546**	**$150,250,184**	**$150,250,184**
Effective Communication – Supervisor						
Agriculture, Forestry, and Fishing						
Alaskan	$0	$0	$28	$0	$28	$28
Central	$0	$0	$1,964,364	$0	$1,964,364	$1,964,364
Eastern	$0	$0	$1,215,238	$0	$1,215,238	$1,215,238
Pacific	$0	$0	$44,631	$0	$44,631	$44,631
Southern	$0	$0	$4,074,345	$0	$4,074,345	$4,074,345
Western	$0	$0	$2,888,709	$0	$2,888,709	$2,888,709
Subtotal	**$0**	**$0**	**$10,187,315**	**$0**	**$10,187,315**	**$10,187,315**
Building Materials and Equipment Suppliers						
Alaskan	$0	$0	$36	$0	$36	$36
Central	$0	$0	$765,503	$0	$765,503	$765,503

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Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$961,428	$0	$961,428	$961,428
Pacific	$0	$0	$54,471	$0	$54,471	$54,471
Southern	$0	$0	$2,264,317	$0	$2,264,317	$2,264,317
Western	$0	$0	$764,695	$0	$764,695	$764,695
Subtotal	**$0**	**$0**	**$4,810,451**	**$0**	**$4,810,451**	**$4,810,451**
Commercial Kitchens						
Alaskan	$0	$0	$131	$0	$131	$131
Central	$0	$0	$3,143,911	$0	$3,143,911	$3,143,911
Eastern	$0	$0	$4,732,451	$0	$4,732,451	$4,732,451
Pacific	$0	$0	$380,104	$0	$380,104	$380,104
Southern	$0	$0	$10,585,830	$0	$10,585,830	$10,585,830
Western	$0	$0	$3,623,278	$0	$3,623,278	$3,623,278
Subtotal	**$0**	**$0**	**$22,465,706**	**$0**	**$22,465,706**	**$22,465,706**
Construction						
Alaskan	$0	$0	$559	$0	$559	$559
Central	$0	$0	$9,137,347	$0	$9,137,347	$9,137,347
Eastern	$0	$0	$13,712,035	$0	$13,712,035	$13,712,035
Pacific	$0	$0	$992,545	$0	$992,545	$992,545
Southern	$0	$0	$31,427,215	$0	$31,427,215	$31,427,215
Western	$0	$0	$10,961,509	$0	$10,961,509	$10,961,509
Subtotal	**$0**	**$0**	**$66,231,210**	**$0**	**$66,231,210**	**$66,231,210**
Drycleaning and Commercial Laundries						
Alaskan	$0	$0	$4	$0	$4	$4
Central	$0	$0	$105,390	$0	$105,390	$105,390
Eastern	$0	$0	$192,692	$0	$192,692	$192,692
Pacific	$0	$0	$15,964	$0	$15,964	$15,964
Southern	$0	$0	$369,774	$0	$369,774	$369,774
Western	$0	$0	$127,300	$0	$127,300	$127,300

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$0**	**$0**	**$811,123**	**$0**	**$811,123**	**$811,123**
Landscaping and Facilities Support						
Alaskan	$0	$0	$156	$0	$156	$156
Central	$0	$0	$2,235,263	$0	$2,235,263	$2,235,263
Eastern	$0	$0	$3,759,687	$0	$3,759,687	$3,759,687
Pacific	$0	$0	$263,459	$0	$263,459	$263,459
Southern	$0	$0	$7,391,500	$0	$7,391,500	$7,391,500
Western	$0	$0	$2,457,942	$0	$2,457,942	$2,457,942
Subtotal	**$0**	**$0**	**$16,108,008**	**$0**	**$16,108,008**	**$16,108,008**
Maintenance and Repair						
Alaskan	$0	$0	$45	$0	$45	$45
Central	$0	$0	$1,088,876	$0	$1,088,876	$1,088,876
Eastern	$0	$0	$1,448,306	$0	$1,448,306	$1,448,306
Pacific	$0	$0	$65,204	$0	$65,204	$65,204
Southern	$0	$0	$3,198,265	$0	$3,198,265	$3,198,265
Western	$0	$0	$1,106,431	$0	$1,106,431	$1,106,431
Subtotal	**$0**	**$0**	**$6,907,125**	**$0**	**$6,907,125**	**$6,907,125**
Manufacturing						
Alaskan	$0	$0	$151	$0	$151	$151
Central	$0	$0	$10,477,364	$0	$10,477,364	$10,477,364
Eastern	$0	$0	$10,527,247	$0	$10,527,247	$10,527,247
Pacific	$0	$0	$116,915	$0	$116,915	$116,915
Southern	$0	$0	$18,442,859	$0	$18,442,859	$18,442,859
Western	$0	$0	$5,656,280	$0	$5,656,280	$5,656,280
Subtotal	**$0**	**$0**	**$45,220,816**	**$0**	**$45,220,816**	**$45,220,816**
Oil and Gas						
Alaskan	$0	$0	$197	$0	$197	$197
Central	$0	$0	$294,598	$0	$294,598	$294,598

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$178,004	$0	$178,004	$178,004
Southern	$0	$0	$4,394,986	$0	$4,394,986	$4,394,986
Western	$0	$0	$213,864	$0	$213,864	$213,864
Subtotal	**$0**	**$0**	**$5,081,648**	**$0**	**$5,081,648**	**$5,081,648**
Postal and Delivery Services						
Alaskan	$0	$0	$10	$0	$10	$10
Central	$0	$0	$380,967	$0	$380,967	$380,967
Eastern	$0	$0	$605,787	$0	$605,787	$605,787
Pacific	$0	$0	$22,894	$0	$22,894	$22,894
Southern	$0	$0	$1,074,645	$0	$1,074,645	$1,074,645
Western	$0	$0	$409,080	$0	$409,080	$409,080
Subtotal	**$0**	**$0**	**$2,493,383**	**$0**	**$2,493,383**	**$2,493,383**
Recreation and Amusement						
Alaskan	$0	$0	$33	$0	$33	$33
Central	$0	$0	$660,935	$0	$660,935	$660,935
Eastern	$0	$0	$1,121,133	$0	$1,121,133	$1,121,133
Pacific	$0	$0	$54,251	$0	$54,251	$54,251
Southern	$0	$0	$2,414,130	$0	$2,414,130	$2,414,130
Western	$0	$0	$906,381	$0	$906,381	$906,381
Subtotal	**$0**	**$0**	**$5,156,864**	**$0**	**$5,156,864**	**$5,156,864**
Sanitation and Waste Removal						
Alaskan	$0	$0	$25	$0	$25	$25
Central	$0	$0	$171,785	$0	$171,785	$171,785
Eastern	$0	$0	$288,897	$0	$288,897	$288,897
Pacific	$0	$0	$19,746	$0	$19,746	$19,746
Southern	$0	$0	$573,019	$0	$573,019	$573,019
Western	$0	$0	$196,550	$0	$196,550	$196,550
Subtotal	**$0**	**$0**	**$1,250,023**	**$0**	**$1,250,023**	**$1,250,023**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Telecommunications						
Alaskan	$0	$0	$36	$0	$36	$36
Central	$0	$0	$425,813	$0	$425,813	$425,813
Eastern	$0	$0	$643,399	$0	$643,399	$643,399
Pacific	$0	$0	$28,284	$0	$28,284	$28,284
Southern	$0	$0	$1,330,181	$0	$1,330,181	$1,330,181
Western	$0	$0	$403,641	$0	$403,641	$403,641
Subtotal	**$0**	**$0**	**$2,831,354**	**$0**	**$2,831,354**	**$2,831,354**
Temporary Help Services						
Alaskan	$0	$0	$13	$0	$13	$13
Central	$0	$0	$2,758,017	$0	$2,758,017	$2,758,017
Eastern	$0	$0	$3,814,255	$0	$3,814,255	$3,814,255
Pacific	$0	$0	$317,980	$0	$317,980	$317,980
Southern	$0	$0	$15,855,219	$0	$15,855,219	$15,855,219
Western	$0	$0	$3,754,041	$0	$3,754,041	$3,754,041
Subtotal	**$0**	**$0**	**$26,499,525**	**$0**	**$26,499,525**	**$26,499,525**
Transportation						
Alaskan	$0	$0	$176	$0	$176	$176
Central	$0	$0	$1,693,569	$0	$1,693,569	$1,693,569
Eastern	$0	$0	$1,739,047	$0	$1,739,047	$1,739,047
Pacific	$0	$0	$216,193	$0	$216,193	$216,193
Southern	$0	$0	$5,538,578	$0	$5,538,578	$5,538,578
Western	$0	$0	$1,501,275	$0	$1,501,275	$1,501,275
Subtotal	**$0**	**$0**	**$10,688,839**	**$0**	**$10,688,839**	**$10,688,839**
Utilities						
Alaskan	$0	$0	$45	$0	$45	$45
Central	$0	$0	$721,516	$0	$721,516	$721,516
Eastern	$0	$0	$1,032,539	$0	$1,032,539	$1,032,539

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$15,379	$0	$15,379	$15,379
Southern	$0	$0	$2,119,922	$0	$2,119,922	$2,119,922
Western	$0	$0	$557,975	$0	$557,975	$557,975
Subtotal	**$0**	**$0**	**$4,447,375**	**$0**	**$4,447,375**	**$4,447,375**
Warehousing						
Alaskan	$0	$0	$4	$0	$4	$4
Central	$0	$0	$611,486	$0	$611,486	$611,486
Eastern	$0	$0	$901,301	$0	$901,301	$901,301
Pacific	$0	$0	$13,316	$0	$13,316	$13,316
Southern	$0	$0	$1,668,522	$0	$1,668,522	$1,668,522
Western	$0	$0	$636,547	$0	$636,547	$636,547
Subtotal	**$0**	**$0**	**$3,831,178**	**$0**	**$3,831,178**	**$3,831,178**
Non-Core						
Alaskan	$0	$0	$1,664	$0	$1,664	$1,664
Central	$0	$0	$28,533,033	$0	$28,533,033	$28,533,033
Eastern	$0	$0	$49,053,020	$0	$49,053,020	$49,053,020
Pacific	$0	$0	$2,542,930	$0	$2,542,930	$2,542,930
Southern	$0	$0	$62,702,524	$0	$62,702,524	$62,702,524
Western	$0	$0	$36,703,176	$0	$36,703,176	$36,703,176
Subtotal	**$0**	**$0**	**$179,536,346**	**$0**	**$179,536,346**	**$179,536,346**
Total Costs for Effective Communication – Supervisor						
Alaskan	$0	$0	$3,312	$0	$3,312	$3,312
Central	$0	$0	$65,169,736	$0	$65,169,736	$65,169,736
Eastern	$0	$0	$95,926,466	$0	$95,926,466	$95,926,466
Pacific	$0	$0	$5,164,266	$0	$5,164,266	$5,164,266
Southern	$0	$0	$175,425,832	$0	$175,425,832	$175,425,832
Western	$0	$0	$72,868,675	$0	$72,868,675	$72,868,675
Total	**$0**	**$0**	**$414,558,288**	**$0**	**$414,558,288**	**$414,558,288**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Effective Communication – Employee						
Agriculture, Forestry, and Fishing						
Alaskan	$0	$0	$30	$0	$30	$30
Central	$0	$0	$2,112,774	$0	$2,112,774	$2,112,774
Eastern	$0	$0	$1,307,050	$0	$1,307,050	$1,307,050
Pacific	$0	$0	$48,003	$0	$48,003	$48,003
Southern	$0	$0	$4,382,165	$0	$4,382,165	$4,382,165
Western	$0	$0	$3,106,954	$0	$3,106,954	$3,106,954
Subtotal	**$0**	**$0**	**$10,956,976**	**$0**	**$10,956,976**	**$10,956,976**
Building Materials and Equipment Suppliers						
Alaskan	$0	$0	$44	$0	$44	$44
Central	$0	$0	$942,412	$0	$942,412	$942,412
Eastern	$0	$0	$1,184,054	$0	$1,184,054	$1,184,054
Pacific	$0	$0	$67,085	$0	$67,085	$67,085
Southern	$0	$0	$2,791,746	$0	$2,791,746	$2,791,746
Western	$0	$0	$942,394	$0	$942,394	$942,394
Subtotal	**$0**	**$0**	**$5,927,736**	**$0**	**$5,927,736**	**$5,927,736**
Commercial Kitchens						
Alaskan	$0	$0	$189	$0	$189	$189
Central	$0	$0	$4,479,892	$0	$4,479,892	$4,479,892
Eastern	$0	$0	$6,743,062	$0	$6,743,062	$6,743,062
Pacific	$0	$0	$537,452	$0	$537,452	$537,452
Southern	$0	$0	$15,142,940	$0	$15,142,940	$15,142,940
Western	$0	$0	$5,158,261	$0	$5,158,261	$5,158,261
Subtotal	**$0**	**$0**	**$32,061,796**	**$0**	**$32,061,796**	**$32,061,796**
Construction						
Alaskan	$0	$0	$757	$0	$757	$757
Central	$0	$0	$12,067,609	$0	$12,067,609	$12,067,609

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$18,192,171	$0	$18,192,171	$18,192,171
Pacific	$0	$0	$1,301,390	$0	$1,301,390	$1,301,390
Southern	$0	$0	$41,487,043	$0	$41,487,043	$41,487,043
Western	$0	$0	$14,467,580	$0	$14,467,580	$14,467,580
Subtotal	**$0**	**$0**	**$87,516,549**	**$0**	**$87,516,549**	**$87,516,549**
Drycleaning and Commercial Laundries						
Alaskan	$0	$0	$5	$0	$5	$5
Central	$0	$0	$132,867	$0	$132,867	$132,867
Eastern	$0	$0	$242,929	$0	$242,929	$242,929
Pacific	$0	$0	$20,126	$0	$20,126	$20,126
Southern	$0	$0	$466,178	$0	$466,178	$466,178
Western	$0	$0	$160,489	$0	$160,489	$160,489
Subtotal	**$0**	**$0**	**$1,022,592**	**$0**	**$1,022,592**	**$1,022,592**
Landscaping and Facilities Support						
Alaskan	$0	$0	$156	$0	$156	$156
Central	$0	$0	$2,278,317	$0	$2,278,317	$2,278,317
Eastern	$0	$0	$3,829,915	$0	$3,829,915	$3,829,915
Pacific	$0	$0	$270,710	$0	$270,710	$270,710
Southern	$0	$0	$7,523,810	$0	$7,523,810	$7,523,810
Western	$0	$0	$2,501,833	$0	$2,501,833	$2,501,833
Subtotal	**$0**	**$0**	**$16,404,742**	**$0**	**$16,404,742**	**$16,404,742**
Maintenance and Repair						
Alaskan	$0	$0	$56	$0	$56	$56
Central	$0	$0	$1,372,758	$0	$1,372,758	$1,372,758
Eastern	$0	$0	$1,825,895	$0	$1,825,895	$1,825,895
Pacific	$0	$0	$82,203	$0	$82,203	$82,203
Southern	$0	$0	$4,032,088	$0	$4,032,088	$4,032,088
Western	$0	$0	$1,394,890	$0	$1,394,890	$1,394,890

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$0**	**$0**	**$8,707,890**	**$0**	**$8,707,890**	**$8,707,890**
Manufacturing						
Alaskan	$0	$0	$158	$0	$158	$158
Central	$0	$0	$10,985,306	$0	$10,985,306	$10,985,306
Eastern	$0	$0	$11,037,608	$0	$11,037,608	$11,037,608
Pacific	$0	$0	$122,583	$0	$122,583	$122,583
Southern	$0	$0	$19,336,968	$0	$19,336,968	$19,336,968
Western	$0	$0	$5,930,496	$0	$5,930,496	$5,930,496
Subtotal	**$0**	**$0**	**$47,413,118**	**$0**	**$47,413,118**	**$47,413,118**
Oil and Gas						
Alaskan	$0	$0	$222	$0	$222	$222
Central	$0	$0	$331,463	$0	$331,463	$331,463
Eastern	$0	$0	$200,341	$0	$200,341	$200,341
Southern	$0	$0	$4,954,004	$0	$4,954,004	$4,954,004
Western	$0	$0	$240,985	$0	$240,985	$240,985
Subtotal	**$0**	**$0**	**$5,727,015**	**$0**	**$5,727,015**	**$5,727,015**
Postal and Delivery Services						
Alaskan	$0	$0	$11	$0	$11	$11
Central	$0	$0	$418,395	$0	$418,395	$418,395
Eastern	$0	$0	$665,304	$0	$665,304	$665,304
Pacific	$0	$0	$25,144	$0	$25,144	$25,144
Southern	$0	$0	$1,180,225	$0	$1,180,225	$1,180,225
Western	$0	$0	$449,271	$0	$449,271	$449,271
Subtotal	**$0**	**$0**	**$2,738,350**	**$0**	**$2,738,350**	**$2,738,350**
Recreation and Amusement						
Alaskan	$0	$0	$36	$0	$36	$36
Central	$0	$0	$716,707	$0	$716,707	$716,707
Eastern	$0	$0	$1,216,575	$0	$1,216,575	$1,216,575

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$58,528	$0	$58,528	$58,528
Southern	$0	$0	$2,617,835	$0	$2,617,835	$2,617,835
Western	$0	$0	$984,819	$0	$984,819	$984,819
Subtotal	**$0**	**$0**	**$5,594,500**	**$0**	**$5,594,500**	**$5,594,500**
Sanitation and Waste Removal						
Alaskan	$0	$0	$25	$0	$25	$25
Central	$0	$0	$169,213	$0	$169,213	$169,213
Eastern	$0	$0	$284,571	$0	$284,571	$284,571
Pacific	$0	$0	$19,451	$0	$19,451	$19,451
Southern	$0	$0	$564,437	$0	$564,437	$564,437
Western	$0	$0	$193,607	$0	$193,607	$193,607
Subtotal	**$0**	**$0**	**$1,231,303**	**$0**	**$1,231,303**	**$1,231,303**
Telecommunications						
Alaskan	$0	$0	$46	$0	$46	$46
Central	$0	$0	$551,961	$0	$551,961	$551,961
Eastern	$0	$0	$834,009	$0	$834,009	$834,009
Pacific	$0	$0	$36,663	$0	$36,663	$36,663
Southern	$0	$0	$1,724,252	$0	$1,724,252	$1,724,252
Western	$0	$0	$523,221	$0	$523,221	$523,221
Subtotal	**$0**	**$0**	**$3,670,153**	**$0**	**$3,670,153**	**$3,670,153**
Temporary Help Services						
Alaskan	$0	$0	$13	$0	$13	$13
Central	$0	$0	$2,716,714	$0	$2,716,714	$2,716,714
Eastern	$0	$0	$3,757,134	$0	$3,757,134	$3,757,134
Pacific	$0	$0	$313,218	$0	$313,218	$313,218
Southern	$0	$0	$15,617,778	$0	$15,617,778	$15,617,778
Western	$0	$0	$3,697,822	$0	$3,697,822	$3,697,822
Subtotal	**$0**	**$0**	**$26,102,678**	**$0**	**$26,102,678**	**$26,102,678**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Transportation						
Alaskan	$0	$0	$194	$0	$194	$194
Central	$0	$0	$1,859,957	$0	$1,859,957	$1,859,957
Eastern	$0	$0	$1,909,903	$0	$1,909,903	$1,909,903
Pacific	$0	$0	$237,434	$0	$237,434	$237,434
Southern	$0	$0	$6,082,726	$0	$6,082,726	$6,082,726
Western	$0	$0	$1,648,771	$0	$1,648,771	$1,648,771
Subtotal	**$0**	**$0**	**$11,738,984**	**$0**	**$11,738,984**	**$11,738,984**
Utilities						
Alaskan	$0	$0	$73	$0	$73	$73
Central	$0	$0	$1,160,185	$0	$1,160,185	$1,160,185
Eastern	$0	$0	$1,660,306	$0	$1,660,306	$1,660,306
Pacific	$0	$0	$24,729	$0	$24,729	$24,729
Southern	$0	$0	$3,408,801	$0	$3,408,801	$3,408,801
Western	$0	$0	$897,215	$0	$897,215	$897,215
Subtotal	**$0**	**$0**	**$7,151,308**	**$0**	**$7,151,308**	**$7,151,308**
Warehousing						
Alaskan	$0	$0	$5	$0	$5	$5
Central	$0	$0	$671,562	$0	$671,562	$671,562
Eastern	$0	$0	$989,851	$0	$989,851	$989,851
Pacific	$0	$0	$14,625	$0	$14,625	$14,625
Southern	$0	$0	$1,832,450	$0	$1,832,450	$1,832,450
Western	$0	$0	$699,086	$0	$699,086	$699,086
Subtotal	**$0**	**$0**	**$4,207,579**	**$0**	**$4,207,579**	**$4,207,579**
Non-Core						
Alaskan	$0	$0	$2,181	$0	$2,181	$2,181
Central	$0	$0	$36,970,389	$0	$36,970,389	$36,970,389
Eastern	$0	$0	$63,618,726	$0	$63,618,726	$63,618,726

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$3,266,173	$0	$3,266,173	$3,266,173
Southern	$0	$0	$78,991,981	$0	$78,991,981	$78,991,981
Western	$0	$0	$48,034,871	$0	$48,034,871	$48,034,871
Subtotal	**$0**	**$0**	**$230,884,322**	**$0**	**$230,884,322**	**$230,884,322**
Total Costs for Effective Communication – Employee						
Alaskan	$0	$0	$4,201	$0	$4,201	$4,201
Central	$0	$0	$79,938,482	$0	$79,938,482	$79,938,482
Eastern	$0	$0	$119,499,404	$0	$119,499,404	$119,499,404
Pacific	$0	$0	$6,445,514	$0	$6,445,514	$6,445,514
Southern	$0	$0	$212,137,427	$0	$212,137,427	$212,137,427
Western	$0	$0	$91,032,564	$0	$91,032,564	$91,032,564
Total	**$0**	**$0**	**$509,057,592**	**$0**	**$509,057,592**	**$509,057,592**
Total Costs for Requirements at or above the Initial Heat Trigger						
Agriculture, Forestry, and Fishing						
Alaskan	$2,582	$2,874	$94	$7	$2,668	$2,961
Central	$290,531	$323,438	$6,809,497	$404,901	$6,695,127	$6,728,034
Eastern	$162,505	$180,911	$4,152,610	$237,681	$4,077,434	$4,095,840
Pacific	$1,935	$2,155	$177,064	$12,822	$166,177	$166,397
Southern	$260,422	$289,919	$12,814,196	$656,948	$12,417,670	$12,447,167
Western	$232,476	$258,807	$8,976,858	$540,871	$8,668,463	$8,694,794
Subtotal	**$950,451**	**$1,058,104**	**$32,930,319**	**$1,853,230**	**$32,027,540**	**$32,135,193**
Building Materials and Equipment Suppliers						
Alaskan	$1,461	$1,626	$130	$11	$1,580	$1,745
Central	$134,180	$149,378	$2,916,552	$192,713	$2,858,020	$2,873,218
Eastern	$167,855	$186,868	$3,586,270	$233,237	$3,520,888	$3,539,901
Pacific	$2,606	$2,901	$229,181	$17,414	$214,373	$214,668
Southern	$154,057	$171,507	$7,783,534	$455,300	$7,482,291	$7,499,741
Western	$105,242	$117,162	$2,788,761	$175,934	$2,718,069	$2,729,990

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$565,401**	**$629,442**	**$17,304,428**	**$1,074,608**	**$16,795,222**	**$16,859,262**
Commercial Kitchens						
Alaskan	$10,503	$11,693	$408	$19	$10,892	$12,082
Central	$1,231,606	$1,371,104	$12,451,003	$471,143	$13,211,467	$13,350,965
Eastern	$1,835,684	$2,043,603	$18,279,032	$662,753	$19,451,963	$19,659,882
Pacific	$39,669	$44,162	$1,785,332	$110,509	$1,714,492	$1,718,985
Southern	$1,635,856	$1,821,141	$38,770,869	$1,465,601	$38,941,123	$39,126,409
Western	$1,092,042	$1,215,732	$13,661,407	$486,073	$14,267,375	$14,391,066
Subtotal	**$5,845,359**	**$6,507,436**	**$84,948,051**	**$3,196,098**	**$87,597,312**	**$88,259,388**
Construction						
Alaskan	$12,220	$13,604	$2,022	$146	$14,097	$15,481
Central	$849,091	$945,263	$36,031,537	$1,981,743	$34,898,885	$34,995,057
Eastern	$1,238,890	$1,379,213	$52,226,855	$2,713,220	$50,752,525	$50,892,848
Pacific	$22,189	$24,702	$4,473,869	$316,331	$4,179,726	$4,182,239
Southern	$1,151,743	$1,282,196	$110,480,523	$5,326,300	$106,305,966	$106,436,419
Western	$680,610	$757,700	$38,361,839	$2,109,291	$36,933,159	$37,010,248
Subtotal	**$3,954,742**	**$4,402,677**	**$241,576,645**	**$12,447,030**	**$233,084,357**	**$233,532,292**
Drycleaning and Commercial Laundries						
Alaskan	$185	$206	$14	$1	$198	$219
Central	$22,582	$25,140	$403,678	$26,160	$400,100	$402,658
Eastern	$43,947	$48,924	$715,273	$44,171	$715,048	$720,026
Pacific	$834	$928	$67,476	$5,105	$63,205	$63,299
Southern	$32,751	$36,461	$1,271,287	$71,699	$1,232,339	$1,236,049
Western	$21,418	$23,843	$463,272	$27,878	$456,811	$459,237
Subtotal	**$121,717**	**$135,503**	**$2,921,000**	**$175,014**	**$2,867,703**	**$2,881,489**
Landscaping and Facilities Support						
Alaskan	$3,686	$4,104	$517	$43	$4,161	$4,578
Central	$222,053	$247,204	$7,611,700	$486,523	$7,347,230	$7,372,381

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$359,816	$400,571	$12,350,876	$749,784	$11,960,908	$12,001,663
Pacific	$6,309	$7,023	$981,924	$71,000	$917,233	$917,948
Southern	$286,418	$318,859	$22,550,982	$1,239,668	$21,597,731	$21,630,172
Western	$214,983	$239,333	$8,126,642	$470,473	$7,871,153	$7,895,503
Subtotal	**$1,093,265**	**$1,217,094**	**$51,622,642**	**$3,017,490**	**$49,698,416**	**$49,822,245**
Maintenance and Repair						
Alaskan	$1,889	$2,103	$166	$14	$2,041	$2,255
Central	$205,609	$228,897	$4,223,953	$270,743	$4,158,818	$4,182,107
Eastern	$267,329	$297,609	$5,448,766	$334,958	$5,381,138	$5,411,417
Pacific	$3,235	$3,601	$281,687	$21,315	$263,607	$263,973
Southern	$240,626	$267,880	$11,104,039	$619,854	$10,724,811	$10,752,066
Western	$163,386	$181,892	$4,085,617	$245,395	$4,003,608	$4,022,114
Subtotal	**$882,074**	**$981,982**	**$25,144,229**	**$1,492,279**	**$24,534,023**	**$24,633,932**
Manufacturing						
Alaskan	$4,850	$5,399	$505	$44	$5,311	$5,861
Central	$1,719,680	$1,914,460	$35,071,755	$2,377,413	$34,414,022	$34,608,802
Eastern	$1,583,237	$1,762,563	$34,664,298	$2,300,305	$33,947,231	$34,126,557
Pacific	$4,686	$5,216	$421,914	$31,866	$394,734	$395,264
Southern	$1,247,724	$1,389,048	$55,965,834	$3,255,437	$53,958,122	$54,099,446
Western	$717,440	$798,701	$18,107,217	$1,149,563	$17,675,095	$17,756,356
Subtotal	**$5,277,616**	**$5,875,387**	**$144,231,525**	**$9,114,627**	**$140,394,515**	**$140,992,285**
Oil and Gas						
Alaskan	$2,991	$3,329	$675	$53	$3,612	$3,951
Central	$34,495	$38,402	$1,106,175	$68,368	$1,072,303	$1,076,210
Eastern	$20,770	$23,123	$654,966	$38,729	$637,008	$639,360
Southern	$173,902	$193,599	$14,164,399	$712,463	$13,625,838	$13,645,535
Western	$19,853	$22,102	$773,687	$47,365	$746,174	$748,423
Subtotal	**$252,011**	**$280,555**	**$16,699,902**	**$866,978**	**$16,084,935**	**$16,113,480**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Postal and Delivery Services						
Alaskan	$918	$1,022	$31	$2	$947	$1,051
Central	$78,862	$87,795	$1,320,012	$72,566	$1,326,308	$1,335,240
Eastern	$116,555	$129,757	$2,043,229	$107,332	$2,052,452	$2,065,653
Pacific	$1,164	$1,295	$88,403	$5,897	$83,669	$83,801
Southern	$82,930	$92,323	$3,383,667	$166,330	$3,300,268	$3,309,661
Western	$58,555	$65,188	$1,353,434	$69,675	$1,342,314	$1,348,946
Subtotal	**$338,985**	**$377,380**	**$8,188,776**	**$421,802**	**$8,105,958**	**$8,144,354**
Recreation and Amusement						
Alaskan	$1,859	$2,069	$84	$3	$1,940	$2,150
Central	$132,718	$147,751	$2,197,203	$64,438	$2,265,483	$2,280,515
Eastern	$214,995	$239,347	$3,620,509	$99,687	$3,735,818	$3,760,169
Pacific	$2,769	$3,082	$215,391	$11,385	$206,774	$207,088
Southern	$161,072	$179,315	$7,439,929	$232,966	$7,368,035	$7,386,279
Western	$130,096	$144,831	$2,873,505	$78,479	$2,925,122	$2,939,857
Subtotal	**$643,508**	**$716,396**	**$16,346,621**	**$486,958**	**$16,503,172**	**$16,576,059**
Sanitation and Waste Removal						
Alaskan	$611	$680	$82	$7	$686	$756
Central	$21,357	$23,776	$569,105	$37,017	$553,445	$555,864
Eastern	$34,579	$38,496	$927,727	$57,240	$905,066	$908,983
Pacific	$595	$663	$70,706	$5,160	$66,142	$66,209
Southern	$27,406	$30,510	$1,692,411	$92,667	$1,627,150	$1,630,254
Western	$18,751	$20,874	$618,635	$37,314	$600,072	$602,196
Subtotal	**$103,299**	**$115,000**	**$3,878,665**	**$229,404**	**$3,752,560**	**$3,764,261**
Telecommunications						
Alaskan	$737	$820	$148	$14	$871	$954
Central	$38,996	$43,413	$1,726,267	$131,585	$1,633,679	$1,638,096
Eastern	$58,352	$64,961	$2,512,631	$181,905	$2,389,078	$2,395,687

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$687	$765	$120,644	$9,689	$111,641	$111,719
Southern	$52,550	$58,502	$4,789,275	$311,184	$4,530,641	$4,536,593
Western	$30,905	$34,405	$1,552,793	$110,416	$1,473,282	$1,476,783
Subtotal	**$182,227**	**$202,867**	**$10,701,758**	**$744,793**	**$10,139,192**	**$10,159,832**
Temporary Help Services						
Alaskan	$463	$516	$42	$4	$502	$555
Central	$422,316	$470,150	$9,038,626	$595,228	$8,865,714	$8,913,548
Eastern	$540,161	$601,342	$12,043,713	$750,212	$11,833,661	$11,894,842
Pacific	$12,627	$14,057	$1,109,256	$80,182	$1,041,701	$1,043,131
Southern	$870,470	$969,064	$46,512,648	$2,603,480	$44,779,638	$44,878,232
Western	$433,572	$482,681	$11,638,266	$701,290	$11,370,549	$11,419,658
Subtotal	**$2,279,609**	**$2,537,809**	**$80,342,552**	**$4,730,396**	**$77,891,765**	**$78,149,965**
Transportation						
Alaskan	$6,145	$6,841	$566	$41	$6,670	$7,366
Central	$310,575	$345,752	$5,901,892	$322,053	$5,890,413	$5,925,590
Eastern	$301,312	$335,440	$5,909,047	$309,850	$5,900,509	$5,934,637
Pacific	$7,536	$8,390	$850,115	$57,626	$800,025	$800,879
Southern	$362,051	$403,059	$17,538,094	$855,821	$17,044,323	$17,085,331
Western	$166,893	$185,797	$4,833,527	$257,881	$4,742,540	$4,761,443
Subtotal	**$1,154,512**	**$1,285,278**	**$35,033,240**	**$1,803,272**	**$34,384,480**	**$34,515,247**
Utilities						
Alaskan	$998	$1,111	$200	$17	$1,181	$1,294
Central	$64,438	$71,736	$3,391,657	$223,584	$3,232,511	$3,239,809
Eastern	$88,068	$98,044	$4,721,144	$300,127	$4,509,085	$4,519,060
Pacific	$396	$441	$84,957	$7,120	$78,232	$78,277
Southern	$79,812	$88,852	$8,888,807	$517,973	$8,450,646	$8,459,686
Western	$38,290	$42,627	$2,493,560	$156,305	$2,375,546	$2,379,883
Subtotal	**$272,003**	**$302,811**	**$19,580,325**	**$1,205,126**	**$18,647,201**	**$18,678,009**

Table VIII.C.24. Total Costs – Requirements at or above the Initial Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Warehousing						
Alaskan	$201	$224	$14	$1	$214	$237
Central	$102,280	$113,864	$2,085,718	$114,415	$2,073,583	$2,085,167
Eastern	$148,725	$165,570	$3,022,555	$161,913	$3,009,367	$3,026,212
Pacific	$674	$750	$51,470	$3,564	$48,580	$48,656
Southern	$126,638	$140,981	$5,223,716	$258,305	$5,092,049	$5,106,393
Western	$86,989	$96,842	$2,088,531	$107,782	$2,067,739	$2,077,591
Subtotal	**$465,506**	**$518,232**	**$12,472,005**	**$645,980**	**$12,291,531**	**$12,344,257**
Non-Core						
Alaskan	$81,107	$90,294	$6,898	$644	$87,362	$96,548
Central	$6,985,646	$7,776,877	$123,758,429	$8,086,368	$122,657,706	$123,448,937
Eastern	$11,318,161	$12,600,116	$204,704,352	$12,848,409	$203,174,104	$204,456,059
Pacific	$167,674	$186,666	$11,950,120	$843,852	$11,273,942	$11,292,933
Southern	$6,932,221	$7,717,400	$234,999,127	$12,729,398	$229,201,949	$229,987,129
Western	$6,490,124	$7,225,230	$151,142,547	$9,528,648	$148,104,024	$148,839,129
Subtotal	**$31,974,933**	**$35,596,583**	**$726,561,474**	**$44,037,320**	**$714,499,087**	**$718,120,736**
Total						
Alaskan	$133,406	$148,516	$12,598	$1,069	$144,935	$160,045
Central	$12,867,014	$14,324,399	$256,614,758	$15,926,958	$253,554,813	$255,012,199
Eastern	$18,500,941	$20,596,455	$371,583,854	$22,131,513	$367,953,282	$370,048,796
Pacific	$275,584	$306,798	$22,959,508	$1,610,839	$21,624,253	$21,655,467
Southern	$13,878,649	$15,450,618	$605,373,338	$31,571,395	$587,680,592	$589,252,561
Western	$10,701,625	$11,913,748	$273,940,099	$16,300,630	$268,341,094	$269,553,217
Total	**$56,357,219**	**$62,740,535**	**$1,530,484,155**	**$87,542,404**	**$1,499,298,970**	**$1,505,682,286**

Source: OSHA estimate.

Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

E. Requirements at or Above the High Heat Trigger.

I. Rest Breaks.

All affected establishments would need to provide affected employees with rest breaks when the high heat trigger is met or exceeded. These rest breaks are different from those at the initial heat trigger in that they are scheduled, reoccurring at least every two hours. Employees would still be allowed rest breaks if needed as outlined under the initial heat trigger requirements, although OSHA estimates that these if-needed rest breaks would be shorter when the high heat trigger is met or exceeded because affected employees would also receive scheduled rest breaks (refer to Section VIII.C.IV.E.I. for more details on the time estimated for high heat trigger rest breaks).

Similar to the initial heat trigger rest breaks, OSHA calculated total high heat trigger rest break costs by estimating the number of hours by work shift type (daytime, evening, and overnight) in a given state that meets or exceeds the high heat trigger and normalizing these estimates to 8-hour work shift equivalents. These 8-hour work shift equivalents are then multiplied by the number of affected employees and the unit costs for both indoor and outdoor work conditions.

As discussed in Section VIII.C.IV.E.I., and detailed further in Appendix A at the end of this section, OSHA estimates that under the proposed standard, the reduction in time spent on pacing (i.e., the increase in worker efficiency) will partially offset the added cost of time spent on if-needed rest breaks as well as scheduled rest breaks when the high heat trigger is met or exceeded for employees in Group 1 (i.e., currently noncompliant with if-needed rest breaks as well as scheduled rest breaks). OSHA also estimates that reduced pacing (i.e., increase in worker efficiency) will partially offset the added cost of scheduled rest breaks when the high heat trigger is met or exceeded for employees in Group 2 (i.e., that are currently noncompliant with only scheduled rest breaks and currently compliant with if-needed rest breaks). Combining this estimated partial offset of the unit costs of rest breaks required when the high heat trigger is met or exceeded with data on the industry-level and/or state-level number of in-scope employees (discussed in Section VIII.B.), baseline non-compliance rates (discussed in Section VIII.C.II.A.), and state-level exposure to temperatures at or above the high heat trigger (discussed in Section VIII.C.II.C.), OSHA estimates that approximately 71.72 percent of the total cost of compliance with rest breaks when the high heat trigger is met or exceeded (approximately $9.92 billion out of $13.83 billion) could be offset by avoided labor productivity losses due to pacing (i.e., avoided losses in worker efficiency).

II. Observation for Signs and Symptoms.

OSHA calculates the total costs for observing signs and symptoms when the high heat trigger is met or exceeded by multiplying the unit costs for both the designated person and at-risk worker by the number of affected employees and the number of 8-hour work shift equivalents. The method to calculate the number of work-shift equivalents is the same approach used in the calculation of total costs for rest breaks.

III. Hazard Alert.

OSHA also calculates the total costs for notifying employees of high heat conditions using 8-hour work shift equivalents. OSHA multiplies these 8-hour work shift equivalents by the number of affected establishments and the corresponding unit cost for a designated person to perform this requirement.

IV. Warning Signs for Excessively High Heat Areas.

OSHA assumed that the cost of placing warning signs for excessively high heat areas is only applicable to industries assumed to have radiant heat sources (as outlined in Table VIII.C.1. and discussed in Section VIII.C.IV.E.IV.). To calculate total costs of this provision, OSHA multiplies the number of affected establishments with radiant heat sources by the unit cost for a warning sign. Similarly, OSHA multiplies the number of affected establishments by the unit cost for a designated person to place that warning sign in an excessively high heat area.

Table VIII.C.25. shows the annualized one-time, annual, and total annualized costs for each of these requirements by industry category and region, discounted (2 percent over a 10-year period) and undiscounted. Note that the best available evidence OSHA employed in this analysis showed no days exceeding the high heat trigger in Alaska and therefore, the agency estimated that most industries in Alaska will not have costs of compliance for requirements at or above the high heat trigger. This may understate the effects in establishments where employees are exposed to process heat. However, OSHA identified no data that would allow an adjustment for this consideration but welcomes comment on the issue.

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Rest Breaks at High Heat Trigger – Indoor						
Agriculture, Forestry, and Fishing						
Central	$0	$0	$10,576,482	$8,053,295	$2,523,187	$2,523,187
Eastern	$0	$0	$8,784,224	$6,685,916	$2,098,307	$2,098,307
Pacific	$0	$0	$138,806	$105,610	$33,196	$33,196
Southern	$0	$0	$47,848,109	$36,415,246	$11,432,863	$11,432,863
Western	$0	$0	$6,577,885	$5,037,349	$1,540,536	$1,540,536
Subtotal	**$0**	**$0**	**$73,925,505**	**$56,297,416**	**$17,628,090**	**$17,628,090**
Building Materials and Equipment Suppliers						
Central	$0	$0	$9,303,121	$7,086,386	$2,216,735	$2,216,735
Eastern	$0	$0	$16,643,764	$12,668,300	$3,975,464	$3,975,464
Pacific	$0	$0	$420,880	$320,205	$100,675	$100,675
Southern	$0	$0	$68,319,209	$51,995,293	$16,323,916	$16,323,916
Western	$0	$0	$6,134,338	$4,688,454	$1,445,885	$1,445,885
Subtotal	**$0**	**$0**	**$100,821,312**	**$76,758,637**	**$24,062,675**	**$24,062,675**
Commercial Kitchens						
Central	$0	$0	$60,520,663	$46,100,638	$14,420,026	$14,420,026
Eastern	$0	$0	$134,221,171	$102,165,211	$32,055,959	$32,055,959
Pacific	$0	$0	$4,437,895	$3,376,261	$1,061,634	$1,061,634
Southern	$0	$0	$511,271,461	$389,110,577	$122,160,884	$122,160,884
Western	$0	$0	$52,350,165	$39,989,637	$12,360,528	$12,360,528
Subtotal	**$0**	**$0**	**$762,801,355**	**$580,742,324**	**$182,059,030**	**$182,059,030**
Construction						
Central	$0	$0	$70,052,483	$53,357,614	$16,694,869	$16,694,869
Eastern	$0	$0	$159,083,213	$121,101,655	$37,981,559	$37,981,559
Pacific	$0	$0	$4,895,384	$3,724,409	$1,170,975	$1,170,975
Southern	$0	$0	$618,272,678	$470,546,413	$147,726,264	$147,726,264
Western	$0	$0	$63,400,197	$48,418,585	$14,981,612	$14,981,612
Subtotal	**$0**	**$0**	**$915,703,956**	**$697,148,676**	**$218,555,280**	**$218,555,280**

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Drycleaning and Commercial Laundries						
Central	$0	$0	$1,543,453	$1,175,718	$367,735	$367,735
Eastern	$0	$0	$4,226,300	$3,216,917	$1,009,383	$1,009,383
Pacific	$0	$0	$152,778	$116,231	$36,547	$36,547
Southern	$0	$0	$13,967,752	$10,630,371	$3,337,381	$3,337,381
Western	$0	$0	$1,365,680	$1,043,429	$322,251	$322,251
Subtotal	**$0**	**$0**	**$21,255,963**	**$16,182,666**	**$5,073,297**	**$5,073,297**
Landscaping and Facilities Support						
Central	$0	$0	$11,258,311	$8,576,633	$2,681,678	$2,681,678
Eastern	$0	$0	$29,789,561	$22,677,209	$7,112,351	$7,112,351
Pacific	$0	$0	$877,456	$667,554	$209,902	$209,902
Southern	$0	$0	$98,622,223	$75,057,866	$23,564,358	$23,564,358
Western	$0	$0	$9,857,882	$7,529,435	$2,328,447	$2,328,447
Subtotal	**$0**	**$0**	**$150,405,433**	**$114,508,696**	**$35,896,737**	**$35,896,737**
Maintenance and Repair						
Central	$0	$0	$12,180,429	$9,277,696	$2,902,733	$2,902,733
Eastern	$0	$0	$24,027,523	$18,289,697	$5,737,826	$5,737,826
Pacific	$0	$0	$468,728	$356,611	$112,117	$112,117
Southern	$0	$0	$91,248,519	$69,446,128	$21,802,391	$21,802,391
Western	$0	$0	$9,080,801	$6,936,248	$2,144,553	$2,144,553
Subtotal	**$0**	**$0**	**$137,006,001**	**$104,306,380**	**$32,699,620**	**$32,699,620**
Manufacturing						
Central	$0	$0	$144,486,598	$110,031,414	$34,455,184	$34,455,184
Eastern	$0	$0	$208,190,782	$158,448,947	$49,741,835	$49,741,835
Pacific	$0	$0	$935,094	$711,392	$223,702	$223,702
Southern	$0	$0	$593,557,344	$451,731,773	$141,825,572	$141,825,572
Western	$0	$0	$47,373,376	$36,217,813	$11,155,562	$11,155,562
Subtotal	**$0**	**$0**	**$994,543,195**	**$757,141,340**	**$237,401,855**	**$237,401,855**
Oil and Gas						

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Central	$0	$0	$1,667,275	$1,270,325	$396,950	$396,950
Eastern	$0	$0	$1,374,956	$1,046,323	$328,634	$328,634
Southern	$0	$0	$75,216,238	$57,244,908	$17,971,330	$17,971,330
Western	$0	$0	$939,050	$716,692	$222,358	$222,358
Subtotal	**$0**	**$0**	**$79,197,520**	**$60,278,247**	**$18,919,272**	**$18,919,272**
Postal and Delivery Services						
Central	$0	$0	$3,723,031	$2,835,752	$887,279	$887,279
Eastern	$0	$0	$8,437,591	$6,422,458	$2,015,134	$2,015,134
Pacific	$0	$0	$135,720	$103,249	$32,471	$32,471
Southern	$0	$0	$26,176,215	$19,921,838	$6,254,377	$6,254,377
Western	$0	$0	$2,784,618	$2,127,847	$656,770	$656,770
Subtotal	**$0**	**$0**	**$41,257,175**	**$31,411,144**	**$9,846,030**	**$9,846,030**
Recreation and Amusement						
Central	$0	$0	$4,665,130	$3,553,632	$1,111,498	$1,111,498
Eastern	$0	$0	$11,919,186	$9,072,587	$2,846,599	$2,846,599
Pacific	$0	$0	$237,458	$180,652	$56,806	$56,806
Southern	$0	$0	$44,104,195	$33,566,359	$10,537,836	$10,537,836
Western	$0	$0	$4,864,366	$3,716,150	$1,148,216	$1,148,216
Subtotal	**$0**	**$0**	**$65,790,335**	**$50,089,379**	**$15,700,955**	**$15,700,955**
Sanitation and Waste Removal						
Central	$0	$0	$1,230,874	$937,606	$293,268	$293,268
Eastern	$0	$0	$2,949,063	$2,244,815	$704,248	$704,248
Pacific	$0	$0	$92,266	$70,195	$22,070	$22,070
Southern	$0	$0	$10,641,076	$8,098,531	$2,542,545	$2,542,545
Western	$0	$0	$997,007	$761,835	$235,171	$235,171
Subtotal	**$0**	**$0**	**$15,910,286**	**$12,112,982**	**$3,797,303**	**$3,797,303**
Telecommunications						
Central	$0	$0	$4,853,408	$3,697,024	$1,156,384	$1,156,384
Eastern	$0	$0	$11,279,180	$8,585,138	$2,694,041	$2,694,041

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$206,445	$157,053	$49,392	$49,392
Southern	$0	$0	$38,488,372	$29,292,248	$9,196,124	$9,196,124
Western	$0	$0	$3,629,760	$2,771,557	$858,203	$858,203
Subtotal	**$0**	**$0**	**$58,457,165**	**$44,503,020**	**$13,954,145**	**$13,954,145**
Temporary Help Services						
Central	$0	$0	$25,313,302	$19,287,681	$6,025,621	$6,025,621
Eastern	$0	$0	$62,178,214	$47,326,395	$14,851,819	$14,851,819
Pacific	$0	$0	$2,126,287	$1,617,581	$508,707	$508,707
Southern	$0	$0	$426,178,792	$324,351,948	$101,826,844	$101,826,844
Western	$0	$0	$29,005,005	$22,159,171	$6,845,833	$6,845,833
Subtotal	**$0**	**$0**	**$544,801,600**	**$414,742,776**	**$130,058,824**	**$130,058,824**
Transportation						
Central	$0	$0	$13,351,018	$10,169,447	$3,181,571	$3,181,571
Eastern	$0	$0	$20,126,557	$15,318,830	$4,807,727	$4,807,727
Pacific	$0	$0	$1,051,426	$799,912	$251,514	$251,514
Southern	$0	$0	$107,284,179	$81,650,279	$25,633,900	$25,633,900
Western	$0	$0	$9,283,022	$7,087,575	$2,195,447	$2,195,447
Subtotal	**$0**	**$0**	**$151,096,202**	**$115,026,042**	**$36,070,160**	**$36,070,160**
Utilities						
Central	$0	$0	$7,982,072	$6,079,447	$1,902,625	$1,902,625
Eastern	$0	$0	$16,193,659	$12,325,758	$3,867,901	$3,867,901
Pacific	$0	$0	$115,621	$87,979	$27,642	$27,642
Southern	$0	$0	$58,183,741	$44,281,543	$13,902,198	$13,902,198
Western	$0	$0	$4,643,754	$3,546,260	$1,097,494	$1,097,494
Subtotal	**$0**	**$0**	**$87,118,847**	**$66,320,986**	**$20,797,860**	**$20,797,860**
Warehousing						
Central	$0	$0	$7,749,473	$5,903,019	$1,846,455	$1,846,455
Eastern	$0	$0	$16,298,484	$12,405,449	$3,893,035	$3,893,035
Pacific	$0	$0	$102,820	$78,225	$24,596	$24,596

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Southern	$0	$0	$49,918,912	$37,991,496	$11,927,417	$11,927,417
Western	$0	$0	$5,276,312	$4,032,474	$1,243,838	$1,243,838
Subtotal	**$0**	**$0**	**$79,346,001**	**$60,410,661**	**$18,935,340**	**$18,935,340**
Non-Core						
Central	$0	$0	$303,342,032	$231,097,706	$72,244,327	$72,244,327
Eastern	$0	$0	$803,385,621	$611,525,275	$191,860,345	$191,860,345
Pacific	$0	$0	$17,129,327	$13,031,481	$4,097,846	$4,097,846
Southern	$0	$0	$1,850,916,061	$1,408,664,889	$442,251,172	$442,251,172
Western	$0	$0	$283,757,707	$216,816,012	$66,941,695	$66,941,695
Subtotal	**$0**	**$0**	**$3,258,530,748**	**$2,481,135,363**	**$777,395,385**	**$777,395,385**
Total Costs for Rest Breaks at High Heat Trigger – Indoor						
Central	$0	$0	$693,799,156	$528,491,032	$165,308,125	$165,308,125
Eastern	$0	$0	$1,539,109,050	$1,171,526,881	$367,582,169	$367,582,169
Pacific	$0	$0	$33,524,391	$25,504,598	$8,019,793	$8,019,793
Southern	$0	$0	$4,730,215,075	$3,599,997,704	$1,130,217,372	$1,130,217,372
Western	$0	$0	$541,320,924	$413,596,523	$127,724,401	$127,724,401
Total	**$0**	**$0**	**$7,537,968,597**	**$5,739,116,737**	**$1,798,851,859**	**$1,798,851,859**
Rest Breaks at High Heat Trigger – Outdoor						
Agriculture, Forestry, and Fishing						
Central	$0	$0	$30,421,837	$20,207,084	$10,214,753	$10,214,753
Eastern	$0	$0	$25,905,352	$17,200,149	$8,705,204	$8,705,204
Pacific	$0	$0	$401,164	$266,259	$134,906	$134,906
Southern	$0	$0	$139,227,176	$92,433,271	$46,793,905	$46,793,905
Western	$0	$0	$18,824,524	$12,575,462	$6,249,063	$6,249,063
Subtotal	**$0**	**$0**	**$214,780,053**	**$142,682,223**	**$72,097,830**	**$72,097,830**
Building Materials and Equipment Suppliers						
Central	$0	$0	$5,468,916	$3,634,104	$1,834,811	$1,834,811
Eastern	$0	$0	$10,027,967	$6,658,390	$3,369,577	$3,369,577
Pacific	$0	$0	$255,772	$169,751	$86,021	$86,021

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Southern	$0	$0	$43,109,868	$28,620,964	$14,488,903	$14,488,903
Western	$0	$0	$3,801,057	$2,534,221	$1,266,836	$1,266,836
Subtotal	**$0**	**$0**	**$62,663,579**	**$41,617,431**	**$21,046,149**	**$21,046,149**
Commercial Kitchens						
Central	$0	$0	$5,882,754	$3,909,101	$1,973,653	$1,973,653
Eastern	$0	$0	$13,027,811	$8,650,431	$4,377,380	$4,377,380
Pacific	$0	$0	$433,257	$287,536	$145,722	$145,722
Southern	$0	$0	$48,771,686	$32,379,881	$16,391,805	$16,391,805
Western	$0	$0	$5,042,717	$3,360,397	$1,682,319	$1,682,319
Subtotal	**$0**	**$0**	**$73,158,225**	**$48,587,346**	**$24,570,879**	**$24,570,879**
Construction						
Central	$0	$0	$132,944,386	$88,332,828	$44,611,559	$44,611,559
Eastern	$0	$0	$293,649,877	$195,001,930	$98,647,947	$98,647,947
Pacific	$0	$0	$9,517,395	$6,316,496	$3,200,899	$3,200,899
Southern	$0	$0	$1,169,092,863	$776,171,055	$392,921,808	$392,921,808
Western	$0	$0	$121,291,239	$80,799,556	$40,491,683	$40,491,683
Subtotal	**$0**	**$0**	**$1,726,495,760**	**$1,146,621,865**	**$579,873,896**	**$579,873,896**
Drycleaning and Commercial Laundries						
Central	$0	$0	$504,941	$335,534	$169,407	$169,407
Eastern	$0	$0	$1,382,635	$918,064	$464,571	$464,571
Pacific	$0	$0	$49,982	$33,171	$16,811	$16,811
Southern	$0	$0	$4,569,552	$3,033,762	$1,535,790	$1,535,790
Western	$0	$0	$446,782	$297,780	$149,002	$149,002
Subtotal	**$0**	**$0**	**$6,953,891**	**$4,618,311**	**$2,335,580**	**$2,335,580**
Landscaping and Facilities Support						
Central	$0	$0	$25,722,284	$17,093,146	$8,629,138	$8,629,138
Eastern	$0	$0	$66,910,496	$44,432,777	$22,477,719	$22,477,719
Pacific	$0	$0	$2,078,513	$1,379,437	$699,076	$699,076
Southern	$0	$0	$221,198,874	$146,855,494	$74,343,380	$74,343,380

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Western	$0	$0	$22,088,210	$14,716,664	$7,371,546	$7,371,546
Subtotal	**$0**	**$0**	**$337,998,378**	**$224,477,518**	**$113,520,859**	**$113,520,859**
Maintenance and Repair						
Central	$0	$0	$10,028,628	$6,663,497	$3,365,131	$3,365,131
Eastern	$0	$0	$19,822,596	$13,162,703	$6,659,893	$6,659,893
Pacific	$0	$0	$393,120	$260,906	$132,214	$132,214
Southern	$0	$0	$73,735,754	$48,953,791	$24,781,963	$24,781,963
Western	$0	$0	$7,565,618	$5,041,201	$2,524,416	$2,524,416
Subtotal	**$0**	**$0**	**$111,545,715**	**$74,082,098**	**$37,463,618**	**$37,463,618**
Manufacturing						
Central	$0	$0	$33,375,481	$22,171,602	$11,203,879	$11,203,879
Eastern	$0	$0	$50,014,418	$33,205,559	$16,808,859	$16,808,859
Pacific	$0	$0	$284,377	$188,727	$95,651	$95,651
Southern	$0	$0	$152,996,536	$101,574,747	$51,421,789	$51,421,789
Western	$0	$0	$11,220,859	$7,484,528	$3,736,331	$3,736,331
Subtotal	**$0**	**$0**	**$247,891,671**	**$164,625,163**	**$83,266,508**	**$83,266,508**
Oil and Gas						
Central	$0	$0	$2,987,040	$1,985,344	$1,001,697	$1,001,697
Eastern	$0	$0	$2,472,347	$1,641,236	$831,110	$831,110
Southern	$0	$0	$138,600,039	$92,018,389	$46,581,650	$46,581,650
Western	$0	$0	$1,710,867	$1,139,088	$571,779	$571,779
Subtotal	**$0**	**$0**	**$145,770,293**	**$96,784,057**	**$48,986,237**	**$48,986,237**
Postal and Delivery Services						
Central	$0	$0	$3,054,541	$2,029,561	$1,024,980	$1,024,980
Eastern	$0	$0	$6,863,635	$4,557,461	$2,306,173	$2,306,173
Pacific	$0	$0	$115,557	$76,687	$38,870	$38,870
Southern	$0	$0	$21,099,271	$14,007,996	$7,091,276	$7,091,276
Western	$0	$0	$2,207,011	$1,471,109	$735,902	$735,902
Subtotal	**$0**	**$0**	**$33,340,014**	**$22,142,814**	**$11,197,200**	**$11,197,200**

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Recreation and Amusement						
Central	$0	$0	$6,372,352	$4,234,424	$2,137,928	$2,137,928
Eastern	$0	$0	$16,280,661	$10,810,418	$5,470,244	$5,470,244
Pacific	$0	$0	$323,230	$214,513	$108,717	$108,717
Southern	$0	$0	$59,913,596	$39,777,337	$20,136,259	$20,136,259
Western	$0	$0	$6,637,770	$4,423,522	$2,214,248	$2,214,248
Subtotal	**$0**	**$0**	**$89,527,609**	**$59,460,214**	**$30,067,395**	**$30,067,395**
Sanitation and Waste Removal						
Central	$0	$0	$1,445,654	$960,612	$485,042	$485,042
Eastern	$0	$0	$3,664,148	$2,433,075	$1,231,073	$1,231,073
Pacific	$0	$0	$117,244	$77,811	$39,433	$39,433
Southern	$0	$0	$13,100,478	$8,697,486	$4,402,992	$4,402,992
Western	$0	$0	$1,172,994	$781,984	$391,010	$391,010
Subtotal	**$0**	**$0**	**$19,500,518**	**$12,950,968**	**$6,549,550**	**$6,549,550**
Telecommunications						
Central	$0	$0	$4,034,928	$2,681,188	$1,353,740	$1,353,740
Eastern	$0	$0	$9,377,005	$6,226,155	$3,150,850	$3,150,850
Pacific	$0	$0	$171,635	$113,903	$57,732	$57,732
Southern	$0	$0	$31,997,519	$21,243,470	$10,754,049	$10,754,049
Western	$0	$0	$3,017,642	$2,010,016	$1,007,626	$1,007,626
Subtotal	**$0**	**$0**	**$48,598,728**	**$32,274,732**	**$16,323,997**	**$16,323,997**
Temporary Help Services						
Central	$0	$0	$12,933,584	$8,596,785	$4,336,798	$4,336,798
Eastern	$0	$0	$31,769,349	$21,094,027	$10,675,322	$10,675,322
Pacific	$0	$0	$1,086,406	$720,978	$365,428	$365,428
Southern	$0	$0	$217,751,879	$144,568,138	$73,183,741	$73,183,741
Western	$0	$0	$14,819,823	$9,876,648	$4,943,175	$4,943,175
Subtotal	**$0**	**$0**	**$278,361,040**	**$184,856,576**	**$93,504,464**	**$93,504,464**
Transportation						

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Central	$0	$0	$17,389,771	$11,555,006	$5,834,765	$5,834,765
Eastern	$0	$0	$25,857,112	$17,168,009	$8,689,103	$8,689,103
Pacific	$0	$0	$1,401,978	$930,441	$471,537	$471,537
Southern	$0	$0	$139,702,133	$92,749,396	$46,952,737	$46,952,737
Western	$0	$0	$12,071,618	$8,039,763	$4,031,855	$4,031,855
Subtotal	**$0**	**$0**	**$196,422,612**	**$130,442,615**	**$65,979,997**	**$65,979,997**
Utilities						
Central	$0	$0	$11,068,721	$7,354,144	$3,714,577	$3,714,577
Eastern	$0	$0	$22,460,044	$14,913,008	$7,547,036	$7,547,036
Pacific	$0	$0	$159,839	$106,099	$53,740	$53,740
Southern	$0	$0	$80,684,859	$53,567,225	$27,117,634	$27,117,634
Western	$0	$0	$6,429,129	$4,282,922	$2,146,208	$2,146,208
Subtotal	**$0**	**$0**	**$120,802,593**	**$80,223,398**	**$40,579,195**	**$40,579,195**
Warehousing						
Central	$0	$0	$3,247,215	$2,157,740	$1,089,476	$1,089,476
Eastern	$0	$0	$6,829,456	$4,534,583	$2,294,873	$2,294,873
Pacific	$0	$0	$43,084	$28,594	$14,491	$14,491
Southern	$0	$0	$20,917,223	$13,887,092	$7,030,131	$7,030,131
Western	$0	$0	$2,210,901	$1,473,997	$736,905	$736,905
Subtotal	**$0**	**$0**	**$33,247,880**	**$22,082,005**	**$11,165,875**	**$11,165,875**
Non-Core						
Central	$0	$0	$246,952,116	$164,137,970	$82,814,146	$82,814,146
Eastern	$0	$0	$727,561,870	$483,115,960	$244,445,911	$244,445,911
Pacific	$0	$0	$16,378,766	$10,869,733	$5,509,033	$5,509,033
Southern	$0	$0	$1,291,042,547	$857,129,196	$433,913,351	$433,913,351
Western	$0	$0	$262,677,028	$175,094,081	$87,582,947	$87,582,947
Subtotal	**$0**	**$0**	**$2,544,612,328**	**$1,690,346,939**	**$854,265,389**	**$854,265,389**
Total Costs for Rest Breaks at High Heat Trigger – Outdoor						
Central	$0	$0	$553,835,149	$368,039,670	$185,795,480	$185,795,480

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$1,333,876,779	$885,723,935	$448,152,844	$448,152,844
Pacific	$0	$0	$33,211,320	$22,041,040	$11,170,280	$11,170,280
Southern	$0	$0	$3,867,511,852	$2,567,668,689	$1,299,843,163	$1,299,843,163
Western	$0	$0	$503,235,789	$335,402,938	$167,832,851	$167,832,851
Total	**$0**	**$0**	**$6,291,670,889**	**$4,178,876,272**	**$2,112,794,617**	**$2,112,794,617**
Observation for Signs and Symptoms – Designated Person						
Agriculture, Forestry, and Fishing						
Central	$0	$0	$559,511	$0	$559,511	$559,511
Eastern	$0	$0	$406,548	$0	$406,548	$406,548
Pacific	$0	$0	$6,788	$0	$6,788	$6,788
Southern	$0	$0	$2,084,391	$0	$2,084,391	$2,084,391
Western	$0	$0	$909,503	$0	$909,503	$909,503
Subtotal	**$0**	**$0**	**$3,966,740**	**$0**	**$3,966,740**	**$3,966,740**
Building Materials and Equipment Suppliers						
Central	$0	$0	$207,109	$0	$207,109	$207,109
Eastern	$0	$0	$297,661	$0	$297,661	$297,661
Pacific	$0	$0	$7,987	$0	$7,987	$7,987
Southern	$0	$0	$1,133,972	$0	$1,133,972	$1,133,972
Western	$0	$0	$255,007	$0	$255,007	$255,007
Subtotal	**$0**	**$0**	**$1,901,736**	**$0**	**$1,901,736**	**$1,901,736**
Commercial Kitchens						
Central	$0	$0	$836,294	$0	$836,294	$836,294
Eastern	$0	$0	$1,474,289	$0	$1,474,289	$1,474,289
Pacific	$0	$0	$52,685	$0	$52,685	$52,685
Southern	$0	$0	$5,113,140	$0	$5,113,140	$5,113,140
Western	$0	$0	$1,225,216	$0	$1,225,216	$1,225,216
Subtotal	**$0**	**$0**	**$8,701,625**	**$0**	**$8,701,625**	**$8,701,625**
Construction						
Central	$0	$0	$2,502,225	$0	$2,502,225	$2,502,225

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$4,636,411	$0	$4,636,411	$4,636,411
Pacific	$0	$0	$153,665	$0	$153,665	$153,665
Southern	$0	$0	$16,364,447	$0	$16,364,447	$16,364,447
Western	$0	$0	$3,765,603	$0	$3,765,603	$3,765,603
Subtotal	**$0**	**$0**	**$27,422,352**	**$0**	**$27,422,352**	**$27,422,352**
Drycleaning and Commercial Laundries						
Central	$0	$0	$28,691	$0	$28,691	$28,691
Eastern	$0	$0	$62,646	$0	$62,646	$62,646
Pacific	$0	$0	$2,402	$0	$2,402	$2,402
Southern	$0	$0	$187,883	$0	$187,883	$187,883
Western	$0	$0	$44,171	$0	$44,171	$44,171
Subtotal	**$0**	**$0**	**$325,794**	**$0**	**$325,794**	**$325,794**
Landscaping and Facilities Support						
Central	$0	$0	$610,504	$0	$610,504	$610,504
Eastern	$0	$0	$1,284,623	$0	$1,284,623	$1,284,623
Pacific	$0	$0	$40,324	$0	$40,324	$40,324
Southern	$0	$0	$3,782,727	$0	$3,782,727	$3,782,727
Western	$0	$0	$861,380	$0	$861,380	$861,380
Subtotal	**$0**	**$0**	**$6,579,558**	**$0**	**$6,579,558**	**$6,579,558**
Maintenance and Repair						
Central	$0	$0	$296,626	$0	$296,626	$296,626
Eastern	$0	$0	$477,300	$0	$477,300	$477,300
Pacific	$0	$0	$9,812	$0	$9,812	$9,812
Southern	$0	$0	$1,627,494	$0	$1,627,494	$1,627,494
Western	$0	$0	$378,264	$0	$378,264	$378,264
Subtotal	**$0**	**$0**	**$2,789,495**	**$0**	**$2,789,495**	**$2,789,495**
Manufacturing						
Central	$0	$0	$2,815,756	$0	$2,815,756	$2,815,756
Eastern	$0	$0	$3,309,944	$0	$3,309,944	$3,309,944

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$17,507	$0	$17,507	$17,507
Southern	$0	$0	$9,185,471	$0	$9,185,471	$9,185,471
Western	$0	$0	$1,892,238	$0	$1,892,238	$1,892,238
Subtotal	**$0**	**$0**	**$17,220,917**	**$0**	**$17,220,917**	**$17,220,917**
Oil and Gas						
Central	$0	$0	$71,167	$0	$71,167	$71,167
Eastern	$0	$0	$43,763	$0	$43,763	$43,763
Southern	$0	$0	$2,287,363	$0	$2,287,363	$2,287,363
Western	$0	$0	$57,779	$0	$57,779	$57,779
Subtotal	**$0**	**$0**	**$2,460,073**	**$0**	**$2,460,073**	**$2,460,073**
Postal and Delivery Services						
Central	$0	$0	$103,744	$0	$103,744	$103,744
Eastern	$0	$0	$192,372	$0	$192,372	$192,372
Pacific	$0	$0	$3,375	$0	$3,375	$3,375
Southern	$0	$0	$535,190	$0	$535,190	$535,190
Western	$0	$0	$138,225	$0	$138,225	$138,225
Subtotal	**$0**	**$0**	**$972,907**	**$0**	**$972,907**	**$972,907**
Recreation and Amusement						
Central	$0	$0	$171,128	$0	$171,128	$171,128
Eastern	$0	$0	$349,544	$0	$349,544	$349,544
Pacific	$0	$0	$7,457	$0	$7,457	$7,457
Southern	$0	$0	$1,169,540	$0	$1,169,540	$1,169,540
Western	$0	$0	$304,739	$0	$304,739	$304,739
Subtotal	**$0**	**$0**	**$2,002,408**	**$0**	**$2,002,408**	**$2,002,408**
Sanitation and Waste Removal						
Central	$0	$0	$45,838	$0	$45,838	$45,838
Eastern	$0	$0	$92,339	$0	$92,339	$92,339
Pacific	$0	$0	$3,032	$0	$3,032	$3,032
Southern	$0	$0	$295,978	$0	$295,978	$295,978

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Western	$0	$0	$66,648	$0	$66,648	$66,648
Subtotal	**$0**	**$0**	**$503,834**	**$0**	**$503,834**	**$503,834**
Telecommunications						
Central	$0	$0	$116,889	$0	$116,889	$116,889
Eastern	$0	$0	$215,275	$0	$215,275	$215,275
Pacific	$0	$0	$4,305	$0	$4,305	$4,305
Southern	$0	$0	$674,933	$0	$674,933	$674,933
Western	$0	$0	$138,645	$0	$138,645	$138,645
Subtotal	**$0**	**$0**	**$1,150,047**	**$0**	**$1,150,047**	**$1,150,047**
Temporary Help Services						
Central	$0	$0	$724,251	$0	$724,251	$724,251
Eastern	$0	$0	$1,296,067	$0	$1,296,067	$1,296,067
Pacific	$0	$0	$48,819	$0	$48,819	$48,819
Southern	$0	$0	$8,228,325	$0	$8,228,325	$8,228,325
Western	$0	$0	$1,330,859	$0	$1,330,859	$1,330,859
Subtotal	**$0**	**$0**	**$11,628,319**	**$0**	**$11,628,319**	**$11,628,319**
Transportation						
Central	$0	$0	$466,232	$0	$466,232	$466,232
Eastern	$0	$0	$554,960	$0	$554,960	$554,960
Pacific	$0	$0	$31,866	$0	$31,866	$31,866
Southern	$0	$0	$2,752,408	$0	$2,752,408	$2,752,408
Western	$0	$0	$508,720	$0	$508,720	$508,720
Subtotal	**$0**	**$0**	**$4,314,186**	**$0**	**$4,314,186**	**$4,314,186**
Utilities						
Central	$0	$0	$193,162	$0	$193,162	$193,162
Eastern	$0	$0	$321,518	$0	$321,518	$321,518
Pacific	$0	$0	$2,267	$0	$2,267	$2,267
Southern	$0	$0	$1,055,740	$0	$1,055,740	$1,055,740
Western	$0	$0	$186,661	$0	$186,661	$186,661

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$0**	**$0**	**$1,759,348**	**$0**	**$1,759,348**	**$1,759,348**
Warehousing						
Central	$0	$0	$174,882	$0	$174,882	$174,882
Eastern	$0	$0	$290,194	$0	$290,194	$290,194
Pacific	$0	$0	$1,963	$0	$1,963	$1,963
Southern	$0	$0	$819,396	$0	$819,396	$819,396
Western	$0	$0	$217,114	$0	$217,114	$217,114
Subtotal	**$0**	**$0**	**$1,503,548**	**$0**	**$1,503,548**	**$1,503,548**
Non-Core						
Central	$0	$0	$7,619,024	$0	$7,619,024	$7,619,024
Eastern	$0	$0	$16,120,110	$0	$16,120,110	$16,120,110
Pacific	$0	$0	$379,699	$0	$379,699	$379,699
Southern	$0	$0	$31,249,924	$0	$31,249,924	$31,249,924
Western	$0	$0	$12,562,661	$0	$12,562,661	$12,562,661
Subtotal	**$0**	**$0**	**$67,931,418**	**$0**	**$67,931,418**	**$67,931,418**
Total Costs for Observation for Signs and Symptoms – Designated Person						
Central	$0	$0	$17,543,033	$0	$17,543,033	$17,543,033
Eastern	$0	$0	$31,425,564	$0	$31,425,564	$31,425,564
Pacific	$0	$0	$773,951	$0	$773,951	$773,951
Southern	$0	$0	$88,548,322	$0	$88,548,322	$88,548,322
Western	$0	$0	$24,843,433	$0	$24,843,433	$24,843,433
Total	**$0**	**$0**	**$163,134,305**	**$0**	**$163,134,305**	**$163,134,305**
Observation for Signs and Symptoms – At–Risk Worker						
Agriculture, Forestry, and Fishing						
Central	$0	$0	$601,783	$0	$601,783	$601,783
Eastern	$0	$0	$437,263	$0	$437,263	$437,263
Pacific	$0	$0	$7,300	$0	$7,300	$7,300
Southern	$0	$0	$2,241,869	$0	$2,241,869	$2,241,869
Western	$0	$0	$978,217	$0	$978,217	$978,217

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$0**	**$0**	**$4,266,431**	**$0**	**$4,266,431**	**$4,266,431**
Building Materials and Equipment Suppliers						
Central	$0	$0	$254,972	$0	$254,972	$254,972
Eastern	$0	$0	$366,669	$0	$366,669	$366,669
Pacific	$0	$0	$9,837	$0	$9,837	$9,837
Southern	$0	$0	$1,398,311	$0	$1,398,311	$1,398,311
Western	$0	$0	$314,304	$0	$314,304	$314,304
Subtotal	**$0**	**$0**	**$2,344,092**	**$0**	**$2,344,092**	**$2,344,092**
Commercial Kitchens						
Central	$0	$0	$1,191,647	$0	$1,191,647	$1,191,647
Eastern	$0	$0	$2,100,615	$0	$2,100,615	$2,100,615
Pacific	$0	$0	$74,334	$0	$74,334	$74,334
Southern	$0	$0	$7,309,702	$0	$7,309,702	$7,309,702
Western	$0	$0	$1,744,049	$0	$1,744,049	$1,744,049
Subtotal	**$0**	**$0**	**$12,420,346**	**$0**	**$12,420,346**	**$12,420,346**
Construction						
Central	$0	$0	$3,298,568	$0	$3,298,568	$3,298,568
Eastern	$0	$0	$6,157,847	$0	$6,157,847	$6,157,847
Pacific	$0	$0	$201,444	$0	$201,444	$201,444
Southern	$0	$0	$21,599,905	$0	$21,599,905	$21,599,905
Western	$0	$0	$4,969,725	$0	$4,969,725	$4,969,725
Subtotal	**$0**	**$0**	**$36,227,490**	**$0**	**$36,227,490**	**$36,227,490**
Drycleaning and Commercial Laundries						
Central	$0	$0	$36,171	$0	$36,171	$36,171
Eastern	$0	$0	$78,978	$0	$78,978	$78,978
Pacific	$0	$0	$3,028	$0	$3,028	$3,028
Southern	$0	$0	$236,867	$0	$236,867	$236,867
Western	$0	$0	$55,687	$0	$55,687	$55,687
Subtotal	**$0**	**$0**	**$410,732**	**$0**	**$410,732**	**$410,732**

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Landscaping and Facilities Support						
Central	$0	$0	$622,110	$0	$622,110	$622,110
Eastern	$0	$0	$1,306,100	$0	$1,306,100	$1,306,100
Pacific	$0	$0	$41,405	$0	$41,405	$41,405
Southern	$0	$0	$3,849,145	$0	$3,849,145	$3,849,145
Western	$0	$0	$876,430	$0	$876,430	$876,430
Subtotal	**$0**	**$0**	**$6,695,191**	**$0**	**$6,695,191**	**$6,695,191**
Maintenance and Repair						
Central	$0	$0	$373,959	$0	$373,959	$373,959
Eastern	$0	$0	$601,737	$0	$601,737	$601,737
Pacific	$0	$0	$12,370	$0	$12,370	$12,370
Southern	$0	$0	$2,051,800	$0	$2,051,800	$2,051,800
Western	$0	$0	$476,882	$0	$476,882	$476,882
Subtotal	**$0**	**$0**	**$3,516,748**	**$0**	**$3,516,748**	**$3,516,748**
Manufacturing						
Central	$0	$0	$2,952,264	$0	$2,952,264	$2,952,264
Eastern	$0	$0	$3,470,410	$0	$3,470,410	$3,470,410
Pacific	$0	$0	$18,356	$0	$18,356	$18,356
Southern	$0	$0	$9,630,782	$0	$9,630,782	$9,630,782
Western	$0	$0	$1,983,974	$0	$1,983,974	$1,983,974
Subtotal	**$0**	**$0**	**$18,055,786**	**$0**	**$18,055,786**	**$18,055,786**
Oil and Gas						
Central	$0	$0	$80,025	$0	$80,025	$80,025
Eastern	$0	$0	$49,232	$0	$49,232	$49,232
Southern	$0	$0	$2,578,365	$0	$2,578,365	$2,578,365
Western	$0	$0	$65,098	$0	$65,098	$65,098
Subtotal	**$0**	**$0**	**$2,772,721**	**$0**	**$2,772,721**	**$2,772,721**
Postal and Delivery Services						
Central	$0	$0	$113,937	$0	$113,937	$113,937

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$211,272	$0	$211,272	$211,272
Pacific	$0	$0	$3,706	$0	$3,706	$3,706
Southern	$0	$0	$587,771	$0	$587,771	$587,771
Western	$0	$0	$151,805	$0	$151,805	$151,805
Subtotal	**$0**	**$0**	**$1,068,492**	**$0**	**$1,068,492**	**$1,068,492**
Recreation and Amusement						
Central	$0	$0	$185,509	$0	$185,509	$185,509
Eastern	$0	$0	$379,348	$0	$379,348	$379,348
Pacific	$0	$0	$8,045	$0	$8,045	$8,045
Southern	$0	$0	$1,268,180	$0	$1,268,180	$1,268,180
Western	$0	$0	$331,134	$0	$331,134	$331,134
Subtotal	**$0**	**$0**	**$2,172,216**	**$0**	**$2,172,216**	**$2,172,216**
Sanitation and Waste Removal						
Central	$0	$0	$45,151	$0	$45,151	$45,151
Eastern	$0	$0	$90,957	$0	$90,957	$90,957
Pacific	$0	$0	$2,986	$0	$2,986	$2,986
Southern	$0	$0	$291,545	$0	$291,545	$291,545
Western	$0	$0	$65,650	$0	$65,650	$65,650
Subtotal	**$0**	**$0**	**$496,289**	**$0**	**$496,289**	**$496,289**
Telecommunications						
Central	$0	$0	$151,517	$0	$151,517	$151,517
Eastern	$0	$0	$279,051	$0	$279,051	$279,051
Pacific	$0	$0	$5,581	$0	$5,581	$5,581
Southern	$0	$0	$874,884	$0	$874,884	$874,884
Western	$0	$0	$179,719	$0	$179,719	$179,719
Subtotal	**$0**	**$0**	**$1,490,753**	**$0**	**$1,490,753**	**$1,490,753**
Temporary Help Services						
Central	$0	$0	$713,404	$0	$713,404	$713,404
Eastern	$0	$0	$1,276,657	$0	$1,276,657	$1,276,657

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$0	$0	$48,088	$0	$48,088	$48,088
Southern	$0	$0	$8,105,101	$0	$8,105,101	$8,105,101
Western	$0	$0	$1,310,928	$0	$1,310,928	$1,310,928
Subtotal	**$0**	**$0**	**$11,454,178**	**$0**	**$11,454,178**	**$11,454,178**
Transportation						
Central	$0	$0	$512,038	$0	$512,038	$512,038
Eastern	$0	$0	$609,483	$0	$609,483	$609,483
Pacific	$0	$0	$34,996	$0	$34,996	$34,996
Southern	$0	$0	$3,022,823	$0	$3,022,823	$3,022,823
Western	$0	$0	$558,700	$0	$558,700	$558,700
Subtotal	**$0**	**$0**	**$4,738,041**	**$0**	**$4,738,041**	**$4,738,041**
Utilities						
Central	$0	$0	$310,601	$0	$310,601	$310,601
Eastern	$0	$0	$516,996	$0	$516,996	$516,996
Pacific	$0	$0	$3,645	$0	$3,645	$3,645
Southern	$0	$0	$1,697,613	$0	$1,697,613	$1,697,613
Western	$0	$0	$300,148	$0	$300,148	$300,148
Subtotal	**$0**	**$0**	**$2,829,003**	**$0**	**$2,829,003**	**$2,829,003**
Warehousing						
Central	$0	$0	$192,063	$0	$192,063	$192,063
Eastern	$0	$0	$318,704	$0	$318,704	$318,704
Pacific	$0	$0	$2,156	$0	$2,156	$2,156
Southern	$0	$0	$899,899	$0	$899,899	$899,899
Western	$0	$0	$238,445	$0	$238,445	$238,445
Subtotal	**$0**	**$0**	**$1,651,267**	**$0**	**$1,651,267**	**$1,651,267**
Non-Core						
Central	$0	$0	$9,855,541	$0	$9,855,541	$9,855,541
Eastern	$0	$0	$21,006,382	$0	$21,006,382	$21,006,382
Pacific	$0	$0	$487,706	$0	$487,706	$487,706

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Southern	$0	$0	$39,335,004	$0	$39,335,004	$39,335,004
Western	$0	$0	$16,443,906	$0	$16,443,906	$16,443,906
Subtotal	**$0**	**$0**	**$87,128,538**	**$0**	**$87,128,538**	**$87,128,538**
Total Costs for Observation for Signs and Symptoms – At–Risk Worker						
Central	$0	$0	$21,491,261	$0	$21,491,261	$21,491,261
Eastern	$0	$0	$39,257,702	$0	$39,257,702	$39,257,702
Pacific	$0	$0	$964,984	$0	$964,984	$964,984
Southern	$0	$0	$106,979,565	$0	$106,979,565	$106,979,565
Western	$0	$0	$31,044,802	$0	$31,044,802	$31,044,802
Total	**$0**	**$0**	**$199,738,313**	**$0**	**$199,738,313**	**$199,738,313**
Initial Hazard Alert – Supervisor						
Agriculture, Forestry, and Fishing						
Central	$0	$0	$71,187	$0	$71,187	$71,187
Eastern	$0	$0	$38,887	$0	$38,887	$38,887
Pacific	$0	$0	$525	$0	$525	$525
Southern	$0	$0	$67,550	$0	$67,550	$67,550
Western	$0	$0	$23,579	$0	$23,579	$23,579
Subtotal	**$0**	**$0**	**$201,728**	**$0**	**$201,728**	**$201,728**
Building Materials and Equipment Suppliers						
Central	$0	$0	$8,975	$0	$8,975	$8,975
Eastern	$0	$0	$13,148	$0	$13,148	$13,148
Pacific	$0	$0	$215	$0	$215	$215
Southern	$0	$0	$12,095	$0	$12,095	$12,095
Western	$0	$0	$8,884	$0	$8,884	$8,884
Subtotal	**$0**	**$0**	**$43,316**	**$0**	**$43,316**	**$43,316**
Commercial Kitchens						
Central	$0	$0	$67,932	$0	$67,932	$67,932
Eastern	$0	$0	$113,247	$0	$113,247	$113,247
Pacific	$0	$0	$2,165	$0	$2,165	$2,165

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Southern	$0	$0	$83,089	$0	$83,089	$83,089
Western	$0	$0	$71,282	$0	$71,282	$71,282
Subtotal	**$0**	**$0**	**$337,715**	**$0**	**$337,715**	**$337,715**
Construction						
Central	$0	$0	$94,901	$0	$94,901	$94,901
Eastern	$0	$0	$139,158	$0	$139,158	$139,158
Pacific	$0	$0	$2,136	$0	$2,136	$2,136
Southern	$0	$0	$103,318	$0	$103,318	$103,318
Western	$0	$0	$55,542	$0	$55,542	$55,542
Subtotal	**$0**	**$0**	**$395,055**	**$0**	**$395,055**	**$395,055**
Drycleaning and Commercial Laundries						
Central	$0	$0	$5,638	$0	$5,638	$5,638
Eastern	$0	$0	$14,483	$0	$14,483	$14,483
Pacific	$0	$0	$114	$0	$114	$114
Southern	$0	$0	$8,547	$0	$8,547	$8,547
Western	$0	$0	$6,139	$0	$6,139	$6,139
Subtotal	**$0**	**$0**	**$34,922**	**$0**	**$34,922**	**$34,922**
Landscaping and Facilities Support						
Central	$0	$0	$30,364	$0	$30,364	$30,364
Eastern	$0	$0	$49,428	$0	$49,428	$49,428
Pacific	$0	$0	$719	$0	$719	$719
Southern	$0	$0	$34,796	$0	$34,796	$34,796
Western	$0	$0	$30,665	$0	$30,665	$30,665
Subtotal	**$0**	**$0**	**$145,973**	**$0**	**$145,973**	**$145,973**
Maintenance and Repair						
Central	$0	$0	$49,834	$0	$49,834	$49,834
Eastern	$0	$0	$66,053	$0	$66,053	$66,053
Pacific	$0	$0	$794	$0	$794	$794
Southern	$0	$0	$53,651	$0	$53,651	$53,651

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Western	$0	$0	$42,009	$0	$42,009	$42,009
Subtotal	**$0**	**$0**	**$212,341**	**$0**	**$212,341**	**$212,341**
Manufacturing						
Central	$0	$0	$18,064	$0	$18,064	$18,064
Eastern	$0	$0	$20,957	$0	$20,957	$20,957
Pacific	$0	$0	$167	$0	$167	$167
Southern	$0	$0	$15,718	$0	$15,718	$15,718
Western	$0	$0	$14,869	$0	$14,869	$14,869
Subtotal	**$0**	**$0**	**$69,774**	**$0**	**$69,774**	**$69,774**
Oil and Gas						
Central	$0	$0	$12,981	$0	$12,981	$12,981
Eastern	$0	$0	$6,913	$0	$6,913	$6,913
Southern	$0	$0	$0	$0	$0	$0
Western	$0	$0	$47,995	$0	$47,995	$47,995
Subtotal	$0	$0	$6,619	$0	$6,619	$6,619
Postal and Delivery Services						
Central	$0	$0	$24,791	$0	$24,791	$24,791
Eastern	$0	$0	$31,359	$0	$31,359	$31,359
Pacific	$0	$0	$331	$0	$331	$331
Southern	$0	$0	$23,087	$0	$23,087	$23,087
Western	$0	$0	$14,795	$0	$14,795	$14,795
Subtotal	**$0**	**$0**	**$94,363**	**$0**	**$94,363**	**$94,363**
Recreation and Amusement						
Central	$0	$0	$20,673	$0	$20,673	$20,673
Eastern	$0	$0	$31,001	$0	$31,001	$31,001
Pacific	$0	$0	$389	$0	$389	$389
Southern	$0	$0	$20,185	$0	$20,185	$20,185
Western	$0	$0	$17,180	$0	$17,180	$17,180
Subtotal	**$0**	**$0**	**$89,428**	**$0**	**$89,428**	**$89,428**

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Sanitation and Waste Removal						
Central	$0	$0	$1,900	$0	$1,900	$1,900
Eastern	$0	$0	$2,742	$0	$2,742	$2,742
Pacific	$0	$0	$42	$0	$42	$42
Southern	$0	$0	$1,990	$0	$1,990	$1,990
Western	$0	$0	$1,343	$0	$1,343	$1,343
Subtotal	**$0**	**$0**	**$8,016**	**$0**	**$8,016**	**$8,016**
Telecommunications						
Central	$0	$0	$6,853	$0	$6,853	$6,853
Eastern	$0	$0	$9,379	$0	$9,379	$9,379
Pacific	$0	$0	$102	$0	$102	$102
Southern	$0	$0	$8,239	$0	$8,239	$8,239
Western	$0	$0	$5,748	$0	$5,748	$5,748
Subtotal	**$0**	**$0**	**$30,322**	**$0**	**$30,322**	**$30,322**
Temporary Help Services						
Central	$0	$0	$3,784	$0	$3,784	$3,784
Eastern	$0	$0	$5,332	$0	$5,332	$5,332
Pacific	$0	$0	$51	$0	$51	$51
Southern	$0	$0	$4,527	$0	$4,527	$4,527
Western	$0	$0	$3,253	$0	$3,253	$3,253
Subtotal	**$0**	**$0**	**$16,947**	**$0**	**$16,947**	**$16,947**
Transportation						
Central	$0	$0	$99,748	$0	$99,748	$99,748
Eastern	$0	$0	$89,795	$0	$89,795	$89,795
Pacific	$0	$0	$1,119	$0	$1,119	$1,119
Southern	$0	$0	$91,342	$0	$91,342	$91,342
Western	$0	$0	$35,838	$0	$35,838	$35,838
Subtotal	**$0**	**$0**	**$317,842**	**$0**	**$317,842**	**$317,842**
Utilities						

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Central	$0	$0	$16,409	$0	$16,409	$16,409
Eastern	$0	$0	$20,570	$0	$20,570	$20,570
Pacific	$0	$0	$141	$0	$141	$141
Southern	$0	$0	$23,071	$0	$23,071	$23,071
Western	$0	$0	$11,751	$0	$11,751	$11,751
Subtotal	**$0**	**$0**	**$71,942**	**$0**	**$71,942**	**$71,942**
Warehousing						
Central	$0	$0	$8,066	$0	$8,066	$8,066
Eastern	$0	$0	$10,200	$0	$10,200	$10,200
Pacific	$0	$0	$129	$0	$129	$129
Southern	$0	$0	$10,013	$0	$10,013	$10,013
Western	$0	$0	$7,574	$0	$7,574	$7,574
Subtotal	**$0**	**$0**	**$35,982**	**$0**	**$35,982**	**$35,982**
Non-Core						
Central	$0	$0	$781,190	$0	$781,190	$781,190
Eastern	$0	$0	$1,221,415	$0	$1,221,415	$1,221,415
Pacific	$0	$0	$18,719	$0	$18,719	$18,719
Southern	$0	$0	$969,956	$0	$969,956	$969,956
Western	$0	$0	$778,728	$0	$778,728	$778,728
Subtotal	**$0**	**$0**	**$3,770,009**	**$0**	**$3,770,009**	**$3,770,009**
Total Costs for Initial Hazard Alert – Supervisor						
Central	$0	$0	$1,323,291	$0	$1,323,291	$1,323,291
Eastern	$0	$0	$1,884,066	$0	$1,884,066	$1,884,066
Pacific	$0	$0	$27,858	$0	$27,858	$27,858
Southern	$0	$0	$1,579,170	$0	$1,579,170	$1,579,170
Western	$0	$0	$1,135,797	$0	$1,135,797	$1,135,797
Total	**$0**	**$0**	**$5,950,182**	**$0**	**$5,950,182**	**$5,950,182**
Subsequent Hazard Alert – Supervisor						
Agriculture, Forestry, and Fishing						

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Central	$0	$0	$149,209	$0	$149,209	$149,209
Eastern	$0	$0	$88,960	$0	$88,960	$88,960
Pacific	$0	$0	$1,530	$0	$1,530	$1,530
Southern	$0	$0	$568,001	$0	$568,001	$568,001
Western	$0	$0	$38,555	$0	$38,555	$38,555
Subtotal	**$0**	**$0**	**$846,254**	**$0**	**$846,254**	**$846,254**
Building Materials and Equipment Suppliers						
Central	$0	$0	$16,253	$0	$16,253	$16,253
Eastern	$0	$0	$25,292	$0	$25,292	$25,292
Pacific	$0	$0	$626	$0	$626	$626
Southern	$0	$0	$115,252	$0	$115,252	$115,252
Western	$0	$0	$24,002	$0	$24,002	$24,002
Subtotal	**$0**	**$0**	**$181,424**	**$0**	**$181,424**	**$181,424**
Commercial Kitchens						
Central	$0	$0	$120,142	$0	$120,142	$120,142
Eastern	$0	$0	$218,769	$0	$218,769	$218,769
Pacific	$0	$0	$6,307	$0	$6,307	$6,307
Southern	$0	$0	$781,907	$0	$781,907	$781,907
Western	$0	$0	$195,280	$0	$195,280	$195,280
Subtotal	**$0**	**$0**	**$1,322,405**	**$0**	**$1,322,405**	**$1,322,405**
Construction						
Central	$0	$0	$164,418	$0	$164,418	$164,418
Eastern	$0	$0	$279,925	$0	$279,925	$279,925
Pacific	$0	$0	$6,223	$0	$6,223	$6,223
Southern	$0	$0	$990,737	$0	$990,737	$990,737
Western	$0	$0	$131,620	$0	$131,620	$131,620
Subtotal	**$0**	**$0**	**$1,572,922**	**$0**	**$1,572,922**	**$1,572,922**
Drycleaning and Commercial Laundries						
Central	$0	$0	$10,046	$0	$10,046	$10,046

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Eastern	$0	$0	$26,309	$0	$26,309	$26,309
Pacific	$0	$0	$332	$0	$332	$332
Southern	$0	$0	$80,016	$0	$80,016	$80,016
Western	$0	$0	$17,282	$0	$17,282	$17,282
Subtotal	**$0**	**$0**	**$133,985**	**$0**	**$133,985**	**$133,985**
Landscaping and Facilities Support						
Central	$0	$0	$54,037	$0	$54,037	$54,037
Eastern	$0	$0	$98,530	$0	$98,530	$98,530
Pacific	$0	$0	$2,096	$0	$2,096	$2,096
Southern	$0	$0	$336,231	$0	$336,231	$336,231
Western	$0	$0	$84,009	$0	$84,009	$84,009
Subtotal	**$0**	**$0**	**$574,904**	**$0**	**$574,904**	**$574,904**
Maintenance and Repair						
Central	$0	$0	$88,347	$0	$88,347	$88,347
Eastern	$0	$0	$132,539	$0	$132,539	$132,539
Pacific	$0	$0	$2,313	$0	$2,313	$2,313
Southern	$0	$0	$506,615	$0	$506,615	$506,615
Western	$0	$0	$115,861	$0	$115,861	$115,861
Subtotal	**$0**	**$0**	**$845,675**	**$0**	**$845,675**	**$845,675**
Manufacturing						
Central	$0	$0	$30,252	$0	$30,252	$30,252
Eastern	$0	$0	$39,098	$0	$39,098	$39,098
Pacific	$0	$0	$487	$0	$487	$487
Southern	$0	$0	$141,837	$0	$141,837	$141,837
Western	$0	$0	$39,037	$0	$39,037	$39,037
Subtotal	**$0**	**$0**	**$250,711**	**$0**	**$250,711**	**$250,711**
Oil and Gas						
Central	$0	$0	$26,387	$0	$26,387	$26,387
Eastern	$0	$0	$10,013	$0	$10,013	$10,013

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Southern	$0	$0	$420,050	$0	$420,050	$420,050
Western	$0	$0	$11,239	$0	$11,239	$11,239
Subtotal	**$0**	**$0**	**$467,689**	**$0**	**$467,689**	**$467,689**
Postal and Delivery Services						
Central	$0	$0	$47,695	$0	$47,695	$47,695
Eastern	$0	$0	$58,857	$0	$58,857	$58,857
Pacific	$0	$0	$965	$0	$965	$965
Southern	$0	$0	$194,296	$0	$194,296	$194,296
Western	$0	$0	$37,304	$0	$37,304	$37,304
Subtotal	**$0**	**$0**	**$339,116**	**$0**	**$339,116**	**$339,116**
Recreation and Amusement						
Central	$0	$0	$35,170	$0	$35,170	$35,170
Eastern	$0	$0	$60,614	$0	$60,614	$60,614
Pacific	$0	$0	$1,133	$0	$1,133	$1,133
Southern	$0	$0	$188,542	$0	$188,542	$188,542
Western	$0	$0	$44,903	$0	$44,903	$44,903
Subtotal	**$0**	**$0**	**$330,363**	**$0**	**$330,363**	**$330,363**
Sanitation and Waste Removal						
Central	$0	$0	$3,271	$0	$3,271	$3,271
Eastern	$0	$0	$5,309	$0	$5,309	$5,309
Pacific	$0	$0	$121	$0	$121	$121
Southern	$0	$0	$18,021	$0	$18,021	$18,021
Western	$0	$0	$3,586	$0	$3,586	$3,586
Subtotal	**$0**	**$0**	**$30,308**	**$0**	**$30,308**	**$30,308**
Telecommunications						
Central	$0	$0	$12,587	$0	$12,587	$12,587
Eastern	$0	$0	$19,110	$0	$19,110	$19,110
Pacific	$0	$0	$298	$0	$298	$298
Southern	$0	$0	$73,609	$0	$73,609	$73,609

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Western	$0	$0	$15,550	$0	$15,550	$15,550
Subtotal	**$0**	**$0**	**$121,154**	**$0**	**$121,154**	**$121,154**
Temporary Help Services						
Central	$0	$0	$6,407	$0	$6,407	$6,407
Eastern	$0	$0	$11,059	$0	$11,059	$11,059
Pacific	$0	$0	$149	$0	$149	$149
Southern	$0	$0	$41,583	$0	$41,583	$41,583
Western	$0	$0	$9,367	$0	$9,367	$9,367
Subtotal	**$0**	**$0**	**$68,566**	**$0**	**$68,566**	**$68,566**
Transportation						
Central	$0	$0	$184,544	$0	$184,544	$184,544
Eastern	$0	$0	$184,968	$0	$184,968	$184,968
Pacific	$0	$0	$3,259	$0	$3,259	$3,259
Southern	$0	$0	$842,960	$0	$842,960	$842,960
Western	$0	$0	$83,587	$0	$83,587	$83,587
Subtotal	**$0**	**$0**	**$1,299,318**	**$0**	**$1,299,318**	**$1,299,318**
Utilities						
Central	$0	$0	$30,683	$0	$30,683	$30,683
Eastern	$0	$0	$44,025	$0	$44,025	$44,025
Pacific	$0	$0	$411	$0	$411	$411
Southern	$0	$0	$201,775	$0	$201,775	$201,775
Western	$0	$0	$29,334	$0	$29,334	$29,334
Subtotal	**$0**	**$0**	**$306,228**	**$0**	**$306,228**	**$306,228**
Warehousing						
Central	$0	$0	$15,139	$0	$15,139	$15,139
Eastern	$0	$0	$22,380	$0	$22,380	$22,380
Pacific	$0	$0	$377	$0	$377	$377
Southern	$0	$0	$87,373	$0	$87,373	$87,373
Western	$0	$0	$21,292	$0	$21,292	$21,292

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$0**	**$0**	**$146,561**	**$0**	**$146,561**	**$146,561**
Non-Core						
Central	$0	$0	$1,389,956	$0	$1,389,956	$1,389,956
Eastern	$0	$0	$2,433,884	$0	$2,433,884	$2,433,884
Pacific	$0	$0	$54,538	$0	$54,538	$54,538
Southern	$0	$0	$9,127,069	$0	$9,127,069	$9,127,069
Western	$0	$0	$2,149,829	$0	$2,149,829	$2,149,829
Subtotal	**$0**	**$0**	**$15,155,276**	**$0**	**$15,155,276**	**$15,155,276**
Total Costs for Subsequent Hazard Alert – Supervisor						
Central	$0	$0	$2,384,543	$0	$2,384,543	$2,384,543
Eastern	$0	$0	$3,759,640	$0	$3,759,640	$3,759,640
Pacific	$0	$0	$81,165	$0	$81,165	$81,165
Southern	$0	$0	$14,715,873	$0	$14,715,873	$14,715,873
Western	$0	$0	$3,051,637	$0	$3,051,637	$3,051,637
Total	**$0**	**$0**	**$23,992,858**	**$0**	**$23,992,858**	**$23,992,858**
Warning Signs						
Commercial Kitchens						
Alaskan	$564	$627	$0	$0	$564	$627
Central	$44,703	$49,766	$0	$0	$44,703	$49,766
Eastern	$77,765	$86,573	$0	$0	$77,765	$86,573
Pacific	$1,463	$1,629	$0	$0	$1,463	$1,629
Southern	$57,794	$64,340	$0	$0	$57,794	$64,340
Western	$49,059	$54,616	$0	$0	$49,059	$54,616
Subtotal	**$231,347**	**$257,551**	**$0**	**$0**	**$231,347**	**$257,551**
Construction						
Alaskan	$151	$168	$0	$0	$151	$168
Central	$10,082	$11,224	$0	$0	$10,082	$11,224
Eastern	$16,073	$17,893	$0	$0	$16,073	$17,893
Pacific	$257	$286	$0	$0	$257	$286

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Southern	$12,900	$14,361	$0	$0	$12,900	$14,361
Western	$6,793	$7,563	$0	$0	$6,793	$7,563
Subtotal	**$46,255**	**$51,494**	**$0**	**$0**	**$46,255**	**$51,494**
Drycleaning and Commercial Laundries						
Alaskan	$20	$22	$0	$0	$20	$22
Central	$2,516	$2,801	$0	$0	$2,516	$2,801
Eastern	$6,463	$7,195	$0	$0	$6,463	$7,195
Pacific	$51	$57	$0	$0	$51	$57
Southern	$3,814	$4,246	$0	$0	$3,814	$4,246
Western	$2,740	$3,050	$0	$0	$2,740	$3,050
Subtotal	**$15,604**	**$17,371**	**$0**	**$0**	**$15,604**	**$17,371**
Landscaping and Facilities Support						
Alaskan	$11	$12	$0	$0	$11	$12
Central	$2,626	$2,924	$0	$0	$2,626	$2,924
Eastern	$3,808	$4,239	$0	$0	$3,808	$4,239
Pacific	$18	$20	$0	$0	$18	$20
Southern	$2,320	$2,583	$0	$0	$2,320	$2,583
Western	$939	$1,046	$0	$0	$939	$1,046
Subtotal	**$9,722**	**$10,824**	**$0**	**$0**	**$9,722**	**$10,824**
Maintenance and Repair						
Alaskan	$40	$44	$0	$0	$40	$44
Central	$2,629	$2,927	$0	$0	$2,629	$2,927
Eastern	$2,729	$3,038	$0	$0	$2,729	$3,038
Pacific	$39	$44	$0	$0	$39	$44
Southern	$2,972	$3,309	$0	$0	$2,972	$3,309
Western	$1,688	$1,879	$0	$0	$1,688	$1,879
Subtotal	**$10,097**	**$11,240**	**$0**	**$0**	**$10,097**	**$11,240**
Manufacturing						
Alaskan	$13	$14	$0	$0	$13	$14

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Central	$3,739	$4,162	$0	$0	$3,739	$4,162
Eastern	$4,182	$4,656	$0	$0	$4,182	$4,656
Pacific	$28	$32	$0	$0	$28	$32
Southern	$3,298	$3,672	$0	$0	$3,298	$3,672
Western	$2,854	$3,177	$0	$0	$2,854	$3,177
Subtotal	**$14,114**	**$15,713**	**$0**	**$0**	**$14,114**	**$15,713**
Oil and Gas						
Alaskan	$10	$11	$0	$0	$10	$11
Central	$736	$819	$0	$0	$736	$819
Eastern	$499	$555	$0	$0	$499	$555
Southern	$1,582	$1,761	$0	$0	$1,582	$1,761
Western	$253	$281	$0	$0	$253	$281
Subtotal	**$3,079**	**$3,428**	**$0**	**$0**	**$3,079**	**$3,428**
Transportation						
Alaskan	$20	$23	$0	$0	$20	$23
Central	$56	$63	$0	$0	$56	$63
Eastern	$137	$153	$0	$0	$137	$153
Pacific	$5	$6	$0	$0	$5	$6
Southern	$208	$231	$0	$0	$208	$231
Western	$55	$62	$0	$0	$55	$62
Subtotal	**$482**	**$536**	**$0**	**$0**	**$482**	**$536**
Utilities						
Alaskan	$79	$88	$0	$0	$79	$88
Central	$2,710	$3,017	$0	$0	$2,710	$3,017
Eastern	$3,593	$4,000	$0	$0	$3,593	$4,000
Pacific	$3	$3	$0	$0	$3	$3
Southern	$3,300	$3,673	$0	$0	$3,300	$3,673
Western	$1,554	$1,730	$0	$0	$1,554	$1,730
Subtotal	**$11,240**	**$12,513**	**$0**	**$0**	**$11,240**	**$12,513**

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Non-Core						
Alaskan	$8	$9	$0	$0	$8	$9
Central	$681	$758	$0	$0	$681	$758
Eastern	$1,759	$1,958	$0	$0	$1,759	$1,958
Pacific	$19	$22	$0	$0	$19	$22
Southern	$804	$895	$0	$0	$804	$895
Western	$1,388	$1,546	$0	$0	$1,388	$1,546
Subtotal	**$4,659**	**$5,187**	**$0**	**$0**	**$4,659**	**$5,187**
Total Costs for Warning Signs						
Alaskan	$915	$1,019	$0	$0	$915	$1,019
Central	$70,478	$78,460	$0	$0	$70,478	$78,460
Eastern	$117,007	$130,260	$0	$0	$117,007	$130,260
Pacific	$1,884	$2,098	$0	$0	$1,884	$2,098
Southern	$88,991	$99,071	$0	$0	$88,991	$99,071
Western	$67,324	$74,949	$0	$0	$67,324	$74,949
Total	**$346,599**	**$385,857**	**$0**	**$0**	**$346,599**	**$385,857**
Signage Placement						
Commercial Kitchens						
Alaskan	$116	$129	$0	$0	$116	$129
Central	$9,215	$10,259	$0	$0	$9,215	$10,259
Eastern	$16,044	$17,862	$0	$0	$16,044	$17,862
Pacific	$303	$337	$0	$0	$303	$337
Southern	$11,913	$13,262	$0	$0	$11,913	$13,262
Western	$10,122	$11,268	$0	$0	$10,122	$11,268
Subtotal	**$47,714**	**$53,118**	**$0**	**$0**	**$47,714**	**$53,118**
Construction						
Alaskan	$73	$82	$0	$0	$73	$82
Central	$4,761	$5,301	$0	$0	$4,761	$5,301
Eastern	$7,589	$8,449	$0	$0	$7,589	$8,449

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Pacific	$125	$139	$0	$0	$125	$139
Southern	$6,167	$6,866	$0	$0	$6,167	$6,866
Western	$3,500	$3,896	$0	$0	$3,500	$3,896
Subtotal	**$22,216**	**$24,732**	**$0**	**$0**	**$22,216**	**$24,732**
Drycleaning and Commercial Laundries						
Alaskan	$7	$8	$0	$0	$7	$8
Central	$846	$941	$0	$0	$846	$941
Eastern	$2,172	$2,419	$0	$0	$2,172	$2,419
Pacific	$17	$19	$0	$0	$17	$19
Southern	$1,282	$1,427	$0	$0	$1,282	$1,427
Western	$921	$1,025	$0	$0	$921	$1,025
Subtotal	**$5,245**	**$5,839**	**$0**	**$0**	**$5,245**	**$5,839**
Landscaping and Facilities Support						
Alaskan	$4	$4	$0	$0	$4	$4
Central	$883	$983	$0	$0	$883	$983
Eastern	$1,280	$1,425	$0	$0	$1,280	$1,425
Pacific	$6	$7	$0	$0	$6	$7
Southern	$780	$868	$0	$0	$780	$868
Western	$316	$352	$0	$0	$316	$352
Subtotal	**$3,268**	**$3,638**	**$0**	**$0**	**$3,268**	**$3,638**
Maintenance and Repair						
Alaskan	$13	$15	$0	$0	$13	$15
Central	$884	$984	$0	$0	$884	$984
Eastern	$917	$1,021	$0	$0	$917	$1,021
Pacific	$13	$15	$0	$0	$13	$15
Southern	$999	$1,112	$0	$0	$999	$1,112
Western	$567	$632	$0	$0	$567	$632
Subtotal	**$3,394**	**$3,778**	**$0**	**$0**	**$3,394**	**$3,778**
Manufacturing						

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Alaskan	$6	$6	$0	$0	$6	$6
Central	$1,615	$1,798	$0	$0	$1,615	$1,798
Eastern	$1,806	$2,011	$0	$0	$1,806	$2,011
Pacific	$12	$14	$0	$0	$12	$14
Southern	$1,425	$1,586	$0	$0	$1,425	$1,586
Western	$1,233	$1,372	$0	$0	$1,233	$1,372
Subtotal	**$6,096**	**$6,787**	**$0**	**$0**	**$6,096**	**$6,787**
Oil and Gas						
Alaskan	$4	$4	$0	$0	$4	$4
Central	$275	$306	$0	$0	$275	$306
Eastern	$187	$208	$0	$0	$187	$208
Southern	$592	$659	$0	$0	$592	$659
Western	$95	$105	$0	$0	$95	$105
Subtotal	**$1,152**	**$1,282**	**$0**	**$0**	**$1,152**	**$1,282**
Transportation						
Alaskan	$8	$9	$0	$0	$8	$9
Central	$21	$23	$0	$0	$21	$23
Eastern	$51	$57	$0	$0	$51	$57
Pacific	$2	$2	$0	$0	$2	$2
Southern	$78	$86	$0	$0	$78	$86
Western	$21	$23	$0	$0	$21	$23
Subtotal	**$180**	**$201**	**$0**	**$0**	**$180**	**$201**
Utilities						
Alaskan	$46	$51	$0	$0	$46	$51
Central	$1,572	$1,750	$0	$0	$1,572	$1,750
Eastern	$2,084	$2,320	$0	$0	$2,084	$2,320
Pacific	$2	$2	$0	$0	$2	$2
Southern	$1,914	$2,130	$0	$0	$1,914	$2,130
Western	$901	$1,003	$0	$0	$901	$1,003

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Subtotal	**$6,518**	**$7,256**	**$0**	**$0**	**$6,518**	**$7,256**
Non-Core						
Alaskan	$5	$5	$0	$0	$5	$5
Central	$402	$448	$0	$0	$402	$448
Eastern	$1,039	$1,156	$0	$0	$1,039	$1,156
Pacific	$11	$13	$0	$0	$11	$13
Southern	$475	$528	$0	$0	$475	$528
Western	$820	$913	$0	$0	$820	$913
Subtotal	**$2,751**	**$3,063**	**$0**	**$0**	**$2,751**	**$3,063**
Total Costs for Signage Placement						
Alaskan	$281	$312	$0	$0	$281	$312
Central	$20,474	$22,793	$0	$0	$20,474	$22,793
Eastern	$33,170	$36,927	$0	$0	$33,170	$36,927
Pacific	$492	$547	$0	$0	$492	$547
Southern	$25,623	$28,525	$0	$0	$25,623	$28,525
Western	$18,495	$20,590	$0	$0	$18,495	$20,590
Total	**$98,534**	**$109,694**	**$0**	**$0**	**$98,534**	**$109,694**
Total Costs for Requirements at or above the High Heat Trigger						
Agriculture, Forestry, and Fishing						
Central	$0	$0	$42,380,008	$28,260,379	$14,119,630	$14,119,630
Eastern	$0	$0	$35,661,233	$23,886,065	$11,775,168	$11,775,168
Pacific	$0	$0	$556,114	$371,868	$184,245	$184,245
Southern	$0	$0	$192,037,096	$128,848,517	$63,188,579	$63,188,579
Western	$0	$0	$27,352,262	$17,612,811	$9,739,451	$9,739,451
Subtotal	**$0**	**$0**	**$297,986,712**	**$198,979,639**	**$99,007,073**	**$99,007,073**
Building Materials and Equipment Suppliers						
Central	$0	$0	$15,259,345	$10,720,490	$4,538,855	$4,538,855
Eastern	$0	$0	$27,374,501	$19,326,690	$8,047,810	$8,047,810
Pacific	$0	$0	$695,315	$489,955	$205,360	$205,360

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Southern	$0	$0	$114,088,707	$80,616,258	$33,472,449	$33,472,449
Western	$0	$0	$10,537,593	$7,222,675	$3,314,918	$3,314,918
Subtotal	**$0**	**$0**	**$167,955,460**	**$118,376,068**	**$49,579,392**	**$49,579,392**
Commercial Kitchens						
Alaskan	$680	$757	$0	$0	$680	$757
Central	$53,918	$60,025	$68,619,433	$50,009,739	$18,663,611	$18,669,718
Eastern	$93,809	$104,434	$151,155,901	$110,815,642	$40,434,069	$40,444,694
Pacific	$1,767	$1,967	$5,006,642	$3,663,797	$1,344,612	$1,344,812
Southern	$69,707	$77,602	$573,330,985	$421,490,458	$151,910,234	$151,918,129
Western	$59,181	$65,884	$60,628,710	$43,350,035	$17,337,856	$17,344,559
Subtotal	**$279,061**	**$310,669**	**$858,741,671**	**$629,329,670**	**$229,691,061**	**$229,722,669**
Construction						
Alaskan	$224	$249	$0	$0	$224	$249
Central	$14,843	$16,524	$209,056,982	$141,690,442	$67,381,383	$67,383,064
Eastern	$23,662	$26,342	$463,946,432	$316,103,585	$147,866,509	$147,869,189
Pacific	$382	$425	$14,776,247	$10,040,905	$4,735,724	$4,735,767
Southern	$19,067	$21,226	$1,826,423,948	$1,246,717,469	$579,725,546	$579,727,706
Western	$10,293	$11,459	$193,613,925	$129,218,140	$64,406,078	$64,407,244
Subtotal	**$68,470**	**$76,226**	**$2,707,817,534**	**$1,843,770,540**	**$864,115,464**	**$864,123,220**
Drycleaning and Commercial Laundries						
Alaskan	$27	$30	$0	$0	$27	$30
Central	$3,362	$3,742	$2,128,940	$1,511,252	$621,050	$621,431
Eastern	$8,636	$9,614	$5,791,351	$4,134,982	$1,665,005	$1,665,983
Pacific	$68	$76	$208,637	$149,402	$59,303	$59,311
Southern	$5,096	$5,674	$19,050,617	$13,664,133	$5,391,581	$5,392,158
Western	$3,660	$4,075	$1,935,742	$1,341,209	$598,194	$598,608
Subtotal	**$20,849**	**$23,210**	**$29,115,287**	**$20,800,977**	**$8,335,159**	**$8,337,520**
Landscaping and Facilities Support						
Alaskan	$14	$16	$0	$0	$14	$16

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Central	$3,509	$3,907	$38,297,610	$25,669,779	$12,631,341	$12,631,739
Eastern	$5,088	$5,664	$99,438,739	$67,109,986	$32,333,840	$32,334,416
Pacific	$24	$27	$3,040,514	$2,046,991	$993,547	$993,550
Southern	$3,100	$3,451	$327,823,997	$221,913,360	$105,913,738	$105,914,089
Western	$1,255	$1,397	$33,798,576	$22,246,099	$11,553,732	$11,553,874
Subtotal	**$12,990**	**$14,462**	**$502,399,436**	**$338,986,214**	**$163,426,212**	**$163,427,683**
Maintenance and Repair						
Alaskan	$53	$59	$0	$0	$53	$59
Central	$3,513	$3,911	$23,017,823	$15,941,193	$7,080,143	$7,080,541
Eastern	$3,646	$4,059	$45,127,748	$31,452,400	$13,678,994	$13,679,407
Pacific	$53	$59	$887,136	$617,516	$269,672	$269,678
Southern	$3,971	$4,421	$169,223,833	$118,399,919	$50,827,885	$50,828,335
Western	$2,255	$2,511	$17,659,435	$11,977,449	$5,684,241	$5,684,496
Subtotal	**$13,491**	**$15,019**	**$255,915,975**	**$178,388,478**	**$77,540,988**	**$77,542,516**
Manufacturing						
Alaskan	$18	$20	$0	$0	$18	$20
Central	$5,353	$5,960	$183,678,416	$132,203,016	$51,480,754	$51,481,360
Eastern	$5,989	$6,667	$265,045,610	$191,654,507	$73,397,092	$73,397,770
Pacific	$41	$45	$1,255,989	$900,119	$355,911	$355,916
Southern	$4,723	$5,258	$765,527,687	$553,306,520	$212,225,890	$212,226,425
Western	$4,087	$4,550	$62,524,352	$43,702,341	$18,826,098	$18,826,561
Subtotal	**$20,211**	**$22,500**	**$1,278,032,055**	**$921,766,502**	**$356,285,763**	**$356,288,052**
Oil and Gas						
Alaskan	$14	$16	$0	$0	$14	$16
Central	$1,011	$1,125	$4,844,875	$3,255,669	$1,590,217	$1,590,331
Eastern	$685	$763	$3,957,224	$2,687,559	$1,270,351	$1,270,429
Southern	$2,173	$2,419	$219,150,051	$149,263,297	$69,888,927	$69,889,173
Western	$347	$387	$2,790,653	$1,855,780	$935,221	$935,260
Subtotal	**$4,231**	**$4,710**	**$230,742,803**	**$157,062,304**	**$73,684,730**	**$73,685,209**

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Postal and Delivery Services						
Central	$0	$0	$7,067,739	$4,865,313	$2,202,426	$2,202,426
Eastern	$0	$0	$15,795,086	$10,979,919	$4,815,167	$4,815,167
Pacific	$0	$0	$259,654	$179,937	$79,717	$79,717
Southern	$0	$0	$48,615,830	$33,929,834	$14,685,996	$14,685,996
Western	$0	$0	$5,333,758	$3,598,956	$1,734,802	$1,734,802
Subtotal	**$0**	**$0**	**$77,072,067**	**$53,553,958**	**$23,518,109**	**$23,518,109**
Recreation and Amusement						
Central	$0	$0	$11,449,963	$7,788,056	$3,661,907	$3,661,907
Eastern	$0	$0	$29,020,353	$19,883,004	$9,137,349	$9,137,349
Pacific	$0	$0	$577,712	$395,164	$182,548	$182,548
Southern	$0	$0	$106,664,237	$73,343,696	$33,320,541	$33,320,541
Western	$0	$0	$12,200,093	$8,139,672	$4,060,421	$4,060,421
Subtotal	**$0**	**$0**	**$159,912,358**	**$109,549,593**	**$50,362,765**	**$50,362,765**
Sanitation and Waste Removal						
Central	$0	$0	$2,772,688	$1,898,218	$874,470	$874,470
Eastern	$0	$0	$6,804,557	$4,677,890	$2,126,667	$2,126,667
Pacific	$0	$0	$215,690	$148,006	$67,684	$67,684
Southern	$0	$0	$24,349,088	$16,796,017	$7,553,071	$7,553,071
Western	$0	$0	$2,307,226	$1,543,819	$763,407	$763,407
Subtotal	**$0**	**$0**	**$36,449,250**	**$25,063,950**	**$11,385,300**	**$11,385,300**
Telecommunications						
Central	$0	$0	$9,176,182	$6,378,212	$2,797,971	$2,797,971
Eastern	$0	$0	$21,179,000	$14,811,293	$6,367,707	$6,367,707
Pacific	$0	$0	$388,366	$270,956	$117,410	$117,410
Southern	$0	$0	$72,117,556	$50,535,718	$21,581,839	$21,581,839
Western	$0	$0	$6,987,064	$4,781,573	$2,205,491	$2,205,491
Subtotal	**$0**	**$0**	**$109,848,169**	**$76,777,752**	**$33,070,417**	**$33,070,417**
Temporary Help Services						

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Central	$0	$0	$39,694,731	$27,884,466	$11,810,265	$11,810,265
Eastern	$0	$0	$96,536,678	$68,420,422	$28,116,256	$28,116,256
Pacific	$0	$0	$3,309,799	$2,338,558	$971,241	$971,241
Southern	$0	$0	$660,310,207	$468,920,086	$191,390,121	$191,390,121
Western	$0	$0	$46,479,235	$32,035,820	$14,443,415	$14,443,415
Subtotal	**$0**	**$0**	**$846,330,650**	**$599,599,352**	**$246,731,298**	**$246,731,298**
Transportation						
Alaskan	$28	$31	$0	$0	$28	$31
Central	$77	$86	$32,003,351	$21,724,453	$10,278,975	$10,278,984
Eastern	$188	$210	$47,422,875	$32,486,839	$14,936,225	$14,936,247
Pacific	$7	$8	$2,524,644	$1,730,353	$794,298	$794,299
Southern	$285	$318	$253,695,845	$174,399,675	$79,296,456	$79,296,488
Western	$76	$85	$22,541,484	$15,127,338	$7,414,223	$7,414,231
Subtotal	**$662**	**$737**	**$358,188,201**	**$245,468,657**	**$112,720,205**	**$112,720,280**
Utilities						
Alaskan	$125	$139	$0	$0	$125	$139
Central	$4,282	$4,767	$19,601,649	$13,433,591	$6,172,340	$6,172,825
Eastern	$5,677	$6,320	$39,556,812	$27,238,766	$12,323,724	$12,324,367
Pacific	$5	$5	$281,923	$194,078	$87,850	$87,850
Southern	$5,213	$5,804	$141,846,798	$97,848,768	$44,003,243	$44,003,834
Western	$2,455	$2,734	$11,600,777	$7,829,182	$3,774,051	$3,774,329
Subtotal	**$17,758**	**$19,769**	**$212,887,959**	**$146,544,384**	**$66,361,333**	**$66,363,344**
Warehousing						
Central	$0	$0	$11,386,839	$8,060,758	$3,326,081	$3,326,081
Eastern	$0	$0	$23,769,417	$16,940,032	$6,829,384	$6,829,384
Pacific	$0	$0	$150,530	$106,818	$43,711	$43,711
Southern	$0	$0	$72,652,817	$51,878,587	$20,774,229	$20,774,229
Western	$0	$0	$7,971,638	$5,506,470	$2,465,168	$2,465,168
Subtotal	**$0**	**$0**	**$115,931,240**	**$82,492,666**	**$33,438,574**	**$33,438,574**

Table VIII.C.25. Total Costs – Requirements at or above the High Heat Trigger (2023$)

Industry Category	One-Time Annualized		Annual	Annual Cost Savings	Total Annualized	
	0%	2%			0%	2%
Non-Core						
Alaskan	$13	$14	$0	$0	$13	$14
Central	$1,083	$1,206	$569,939,859	$395,235,676	$174,705,267	$174,705,390
Eastern	$2,798	$3,114	$1,571,729,282	$1,094,641,235	$477,090,844	$477,091,161
Pacific	$31	$34	$34,448,756	$23,901,214	$10,547,573	$10,547,576
Southern	$1,278	$1,423	$3,222,640,561	$2,265,794,085	$956,847,754	$956,847,899
Western	$2,208	$2,458	$578,369,859	$391,910,093	$186,461,974	$186,462,224
Subtotal	**$7,410**	**$8,250**	**$5,977,128,316**	**$4,171,482,302**	**$1,805,653,424**	**$1,805,654,264**
Total						
Alaskan	$1,196	$1,331	$0	$0	$1,196	$1,331
Central	$90,952	$101,253	$1,290,376,435	$896,530,702	$393,936,685	$393,946,986
Eastern	$150,177	$167,187	$2,949,312,800	$2,057,250,816	$892,212,161	$892,229,171
Pacific	$2,376	$2,645	$68,583,668	$47,545,638	$21,040,406	$21,040,676
Southern	$114,614	$127,596	$8,809,549,859	$6,167,666,393	$2,641,998,079	$2,642,011,061
Western	$85,819	$95,539	$1,104,632,382	$748,999,461	$355,718,740	$355,728,460
Total	**$445,133**	**$495,551**	**$14,222,455,144**	**$9,917,993,009**	**$4,304,907,268**	**$4,304,957,686**

Source: OSHA estimate.

Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

F. Heat Illness and Emergency Response and Planning.

All covered employers would be required to respond when employees are experiencing signs and symptoms of heat-related illness or when there is a heat-related emergency at their work sites.

OSHA calculates the total costs associated with responding to heat-related illnesses by multiplying the labor-based unit cost by the number of affected establishments and the number of heat-related illnesses per establishment (shown in Table VIII.C.6.).

OSHA calculates the total costs associated with responding to heat-related emergencies as a sum of total labor-based costs and capital-based costs. Total labor-based costs are calculated by multiplying the labor-based unit costs by the number of affected establishments and the number of heat-related emergencies per establishment (also shown in Table VIII.C.6.). As discussed in Section VIII.C.IV.F., labor-based unit costs incurred during heat-related emergencies consist of reducing an employee's body temperature before emergency medical services arrive as well as contacting emergency medical services and transporting employees to a place where they can be reached by an emergency medical provider. Total capital-based costs are calculated by multiplying the capital-based unit costs by the number of affected establishments. As discussed in Section VIII.C.IV.F., capital-based unit costs consist of ice, ice sheets, and ice coolers. Cost frequency is assumed to be one-time for purchases of ice sheets and ice coolers and the costs of purchasing ice when the initial heat trigger is met or exceeded are calculated on an annual basis. OSHA assumes that ice costs are incurred only when the initial heat trigger is met or exceeded. Using this assumption, OSHA multiplied the number of 8-hour work shift equivalents by the number of affected establishments and the unit cost for ice to determine the total annual costs associated with ice purchases.

Table VIII.C.26. shows the annualized one-time, annual, and total annualized costs for each of these requirements by industry category and region, discounted (2 percent over a 10-year period) and undiscounted.

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Medical Response – Non–Emergency					
Agriculture, Forestry, and Fishing					
Alaskan	$0	$0	$22	$22	$22
Central	$0	$0	$1,561	$1,561	$1,561
Eastern	$0	$0	$822	$822	$822
Pacific	$0	$0	$11	$11	$11
Southern	$0	$0	$1,427	$1,427	$1,427
Western	$0	$0	$212	$212	$212
Subtotal	**$0**	**$0**	**$4,055**	**$4,055**	**$4,055**
Building Materials and Equipment Suppliers					
Alaskan	$0	$0	$4	$4	$4
Central	$0	$0	$390	$390	$390
Eastern	$0	$0	$608	$608	$608
Pacific	$0	$0	$10	$10	$10
Southern	$0	$0	$543	$543	$543
Western	$0	$0	$342	$342	$342
Subtotal	**$0**	**$0**	**$1,897**	**$1,897**	**$1,897**
Commercial Kitchens					
Alaskan	$0	$0	$8	$8	$8
Central	$0	$0	$656	$656	$656
Eastern	$0	$0	$1,098	$1,098	$1,098
Pacific	$0	$0	$23	$23	$23
Southern	$0	$0	$791	$791	$791
Western	$0	$0	$561	$561	$561
Subtotal	**$0**	**$0**	**$3,136**	**$3,136**	**$3,136**
Construction					

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Alaskan	$0	$0	$39	$39	$39
Central	$0	$0	$3,014	$3,014	$3,014
Eastern	$0	$0	$3,653	$3,653	$3,653
Pacific	$0	$0	$54	$54	$54
Southern	$0	$0	$2,649	$2,649	$2,649
Western	$0	$0	$726	$726	$726
Subtotal	**$0**	**$0**	**$10,134**	**$10,134**	**$10,134**
Drycleaning and Commercial Laundries					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$38	$38	$38
Eastern	$0	$0	$97	$97	$97
Pacific	$0	$0	$1	$1	$1
Southern	$0	$0	$57	$57	$57
Western	$0	$0	$35	$35	$35
Subtotal	**$0**	**$0**	**$228**	**$228**	**$228**
Landscaping and Facilities Support					
Alaskan	$0	$0	$22	$22	$22
Central	$0	$0	$1,829	$1,829	$1,829
Eastern	$0	$0	$3,022	$3,022	$3,022
Pacific	$0	$0	$40	$40	$40
Southern	$0	$0	$2,154	$2,154	$2,154
Western	$0	$0	$1,699	$1,699	$1,699
Subtotal	**$0**	**$0**	**$8,766**	**$8,766**	**$8,766**
Maintenance and Repair					
Alaskan	$0	$0	$3	$3	$3
Central	$0	$0	$334	$334	$334
Eastern	$0	$0	$442	$442	$442
Pacific	$0	$0	$5	$5	$5

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Southern	$0	$0	$359	$359	$359
Western	$0	$0	$231	$231	$231
Subtotal	**$0**	**$0**	**$1,376**	**$1,376**	**$1,376**
Manufacturing					
Alaskan	$0	$0	$13	$13	$13
Central	$0	$0	$2,617	$2,617	$2,617
Eastern	$0	$0	$2,545	$2,545	$2,545
Pacific	$0	$0	$20	$20	$20
Southern	$0	$0	$1,908	$1,908	$1,908
Western	$0	$0	$1,440	$1,440	$1,440
Subtotal	**$0**	**$0**	**$8,544**	**$8,544**	**$8,544**
Oil and Gas					
Alaskan	$0	$0	$17	$17	$17
Central	$0	$0	$671	$671	$671
Eastern	$0	$0	$351	$351	$351
Southern	$0	$0	$2,546	$2,546	$2,546
Western	$0	$0	$335	$335	$335
Subtotal	**$0**	**$0**	**$3,921**	**$3,921**	**$3,921**
Postal and Delivery Services					
Alaskan	$0	$0	$19	$19	$19
Central	$0	$0	$799	$799	$799
Eastern	$0	$0	$1,011	$1,011	$1,011
Pacific	$0	$0	$11	$11	$11
Southern	$0	$0	$744	$744	$744
Western	$0	$0	$375	$375	$375
Subtotal	**$0**	**$0**	**$2,958**	**$2,958**	**$2,958**
Recreation and Amusement					
Alaskan	$0	$0	$6	$6	$6

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Central	$0	$0	$267	$267	$267
Eastern	$0	$0	$401	$401	$401
Pacific	$0	$0	$5	$5	$5
Southern	$0	$0	$261	$261	$261
Western	$0	$0	$175	$175	$175
Subtotal	**$0**	**$0**	**$1,116**	**$1,116**	**$1,116**
Sanitation and Waste Removal					
Alaskan	$0	$0	$6	$6	$6
Central	$0	$0	$217	$217	$217
Eastern	$0	$0	$313	$313	$313
Pacific	$0	$0	$5	$5	$5
Southern	$0	$0	$227	$227	$227
Western	$0	$0	$119	$119	$119
Subtotal	**$0**	**$0**	**$887**	**$887**	**$887**
Telecommunications					
Alaskan	$0	$0	$11	$11	$11
Central	$0	$0	$696	$696	$696
Eastern	$0	$0	$952	$952	$952
Pacific	$0	$0	$10	$10	$10
Southern	$0	$0	$837	$837	$837
Western	$0	$0	$467	$467	$467
Subtotal	**$0**	**$0**	**$2,974**	**$2,974**	**$2,974**
Temporary Help Services					
Alaskan	$0	$0	$2	$2	$2
Central	$0	$0	$432	$432	$432
Eastern	$0	$0	$609	$609	$609
Pacific	$0	$0	$6	$6	$6
Southern	$0	$0	$517	$517	$517

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Western	$0	$0	$306	$306	$306
Subtotal	**$0**	**$0**	**$1,873**	**$1,873**	**$1,873**
Transportation					
Alaskan	$0	$0	$52	$52	$52
Central	$0	$0	$3,215	$3,215	$3,215
Eastern	$0	$0	$2,894	$2,894	$2,894
Pacific	$0	$0	$36	$36	$36
Southern	$0	$0	$2,944	$2,944	$2,944
Western	$0	$0	$726	$726	$726
Subtotal	**$0**	**$0**	**$9,867**	**$9,867**	**$9,867**
Utilities					
Alaskan	$0	$0	$13	$13	$13
Central	$0	$0	$546	$546	$546
Eastern	$0	$0	$685	$685	$685
Pacific	$0	$0	$5	$5	$5
Southern	$0	$0	$768	$768	$768
Western	$0	$0	$315	$315	$315
Subtotal	**$0**	**$0**	**$2,332**	**$2,332**	**$2,332**
Warehousing					
Alaskan	$0	$0	$2	$2	$2
Central	$0	$0	$260	$260	$260
Eastern	$0	$0	$329	$329	$329
Pacific	$0	$0	$4	$4	$4
Southern	$0	$0	$323	$323	$323
Western	$0	$0	$203	$203	$203
Subtotal	**$0**	**$0**	**$1,120**	**$1,120**	**$1,120**
Non-Core					
Alaskan	$0	$0	$953	$953	$953

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Central	$0	$0	$57,371	$57,371	$57,371
Eastern	$0	$0	$47,165	$47,165	$47,165
Pacific	$0	$0	$435	$435	$435
Southern	$0	$0	$22,835	$22,835	$22,835
Western	$0	$0	$19,411	$19,411	$19,411
Subtotal	**$0**	**$0**	**$148,169**	**$148,169**	**$148,169**
Total Costs for Medical Response – Non–Emergency					
Alaskan	$0	$0	$1,193	$1,193	$1,193
Central	$0	$0	$74,912	$74,912	$74,912
Eastern	$0	$0	$66,997	$66,997	$66,997
Pacific	$0	$0	$681	$681	$681
Southern	$0	$0	$41,890	$41,890	$41,890
Western	$0	$0	$27,678	$27,678	$27,678
Total	**$0**	**$0**	**$213,352**	**$213,352**	**$213,352**
Medical Response – Emergency					
Agriculture, Forestry, and Fishing					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$28	$28	$28
Eastern	$0	$0	$15	$15	$15
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$25	$25	$25
Western	$0	$0	$4	$4	$4
Subtotal	**$0**	**$0**	**$72**	**$72**	**$72**
Building Materials and Equipment Suppliers					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$6	$6	$6
Eastern	$0	$0	$10	$10	$10
Pacific	$0	$0	$0	$0	$0

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Southern	$0	$0	$9	$9	$9
Western	$0	$0	$5	$5	$5
Subtotal	**$0**	**$0**	**$30**	**$30**	**$30**
Commercial Kitchens					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$11	$11	$11
Eastern	$0	$0	$18	$18	$18
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$13	$13	$13
Western	$0	$0	$9	$9	$9
Subtotal	**$0**	**$0**	**$51**	**$51**	**$51**
Construction					
Alaskan	$0	$0	$1	$1	$1
Central	$0	$0	$53	$53	$53
Eastern	$0	$0	$64	$64	$64
Pacific	$0	$0	$1	$1	$1
Southern	$0	$0	$47	$47	$47
Western	$0	$0	$13	$13	$13
Subtotal	**$0**	**$0**	**$178**	**$178**	**$178**
Drycleaning and Commercial Laundries					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$1	$1	$1
Eastern	$0	$0	$2	$2	$2
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$1	$1	$1
Western	$0	$0	$1	$1	$1
Subtotal	**$0**	**$0**	**$4**	**$4**	**$4**
Landscaping and Facilities Support					

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$31	$31	$31
Eastern	$0	$0	$51	$51	$51
Pacific	$0	$0	$1	$1	$1
Southern	$0	$0	$36	$36	$36
Western	$0	$0	$29	$29	$29
Subtotal	**$0**	**$0**	**$147**	**$147**	**$147**
Maintenance and Repair					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$5	$5	$5
Eastern	$0	$0	$7	$7	$7
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$6	$6	$6
Western	$0	$0	$4	$4	$4
Subtotal	**$0**	**$0**	**$22**	**$22**	**$22**
Manufacturing					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$43	$43	$43
Eastern	$0	$0	$41	$41	$41
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$31	$31	$31
Western	$0	$0	$23	$23	$23
Subtotal	**$0**	**$0**	**$139**	**$139**	**$139**
Oil and Gas					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$12	$12	$12
Eastern	$0	$0	$6	$6	$6
Southern	$0	$0	$45	$45	$45

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Western	$0	$0	$6	$6	$6
Subtotal	**$0**	**$0**	**$69**	**$69**	**$69**
Postal and Delivery Services					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$13	$13	$13
Eastern	$0	$0	$16	$16	$16
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$12	$12	$12
Western	$0	$0	$6	$6	$6
Subtotal	**$0**	**$0**	**$47**	**$47**	**$47**
Recreation and Amusement					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$4	$4	$4
Eastern	$0	$0	$7	$7	$7
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$4	$4	$4
Western	$0	$0	$3	$3	$3
Subtotal	**$0**	**$0**	**$18**	**$18**	**$18**
Sanitation and Waste Removal					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$4	$4	$4
Eastern	$0	$0	$5	$5	$5
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$4	$4	$4
Western	$0	$0	$2	$2	$2
Subtotal	**$0**	**$0**	**$15**	**$15**	**$15**
Telecommunications					
Alaskan	$0	$0	$0	$0	$0

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Central	$0	$0	$11	$11	$11
Eastern	$0	$0	$15	$15	$15
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$13	$13	$13
Western	$0	$0	$7	$7	$7
Subtotal	**$0**	**$0**	**$48**	**$48**	**$48**
Temporary Help Services					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$7	$7	$7
Eastern	$0	$0	$10	$10	$10
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$9	$9	$9
Western	$0	$0	$5	$5	$5
Subtotal	**$0**	**$0**	**$32**	**$32**	**$32**
Transportation					
Alaskan	$0	$0	$1	$1	$1
Central	$0	$0	$51	$51	$51
Eastern	$0	$0	$46	$46	$46
Pacific	$0	$0	$1	$1	$1
Southern	$0	$0	$47	$47	$47
Western	$0	$0	$12	$12	$12
Subtotal	**$0**	**$0**	**$158**	**$158**	**$158**
Utilities					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$9	$9	$9
Eastern	$0	$0	$11	$11	$11
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$12	$12	$12

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Western	$0	$0	$5	$5	$5
Subtotal	**$0**	**$0**	**$37**	**$37**	**$37**
Warehousing					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$4	$4	$4
Eastern	$0	$0	$5	$5	$5
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$5	$5	$5
Western	$0	$0	$3	$3	$3
Subtotal	**$0**	**$0**	**$18**	**$18**	**$18**
Non-Core					
Alaskan	$0	$0	$15	$15	$15
Central	$0	$0	$914	$914	$914
Eastern	$0	$0	$756	$756	$756
Pacific	$0	$0	$7	$7	$7
Southern	$0	$0	$369	$369	$369
Western	$0	$0	$313	$313	$313
Subtotal	**$0**	**$0**	**$2,375**	**$2,375**	**$2,375**
Total Costs for Medical Response – Emergency					
Alaskan	$0	$0	$19	$19	$19
Central	$0	$0	$1,207	$1,207	$1,207
Eastern	$0	$0	$1,086	$1,086	$1,086
Pacific	$0	$0	$11	$11	$11
Southern	$0	$0	$688	$688	$688
Western	$0	$0	$449	$449	$449
Total	**$0**	**$0**	**$3,460**	**$3,460**	**$3,460**
Contact Emergency Medical Services					
Agriculture, Forestry, and Fishing					

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$4	$4	$4
Eastern	$0	$0	$2	$2	$2
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$4	$4	$4
Western	$0	$0	$1	$1	$1
Subtotal	**$0**	**$0**	**$12**	**$12**	**$12**
Building Materials and Equipment Suppliers					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$1	$1	$1
Eastern	$0	$0	$2	$2	$2
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$1	$1	$1
Western	$0	$0	$1	$1	$1
Subtotal	**$0**	**$0**	**$5**	**$5**	**$5**
Commercial Kitchens					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$2	$2	$2
Eastern	$0	$0	$3	$3	$3
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$2	$2	$2
Western	$0	$0	$1	$1	$1
Subtotal	**$0**	**$0**	**$8**	**$8**	**$8**
Construction					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$8	$8	$8
Eastern	$0	$0	$10	$10	$10
Pacific	$0	$0	$0	$0	$0

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Southern	$0	$0	$7	$7	$7
Western	$0	$0	$2	$2	$2
Subtotal	**$0**	**$0**	**$28**	**$28**	**$28**
Drycleaning and Commercial Laundries					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$0	$0	$0
Eastern	$0	$0	$0	$0	$0
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$0	$0	$0
Western	$0	$0	$0	$0	$0
Subtotal	**$0**	**$0**	**$1**	**$1**	**$1**
Landscaping and Facilities Support					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$5	$5	$5
Eastern	$0	$0	$8	$8	$8
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$6	$6	$6
Western	$0	$0	$5	$5	$5
Subtotal	**$0**	**$0**	**$24**	**$24**	**$24**
Maintenance and Repair					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$1	$1	$1
Eastern	$0	$0	$1	$1	$1
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$1	$1	$1
Western	$0	$0	$1	$1	$1
Subtotal	**$0**	**$0**	**$4**	**$4**	**$4**
Manufacturing					

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$2	$2	$2
Eastern	$0	$0	$1	$1	$1
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$5	$5	$5
Western	$0	$0	$4	$4	$4
Subtotal	**$0**	**$0**	**$22**	**$22**	**$22**
Oil and Gas					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$2	$2	$2
Eastern	$0	$0	$1	$1	$1
Southern	$0	$0	$7	$7	$7
Western	$0	$0	$1	$1	$1
Subtotal	**$0**	**$0**	**$11**	**$11**	**$11**
Postal and Delivery Services					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$2	$2	$2
Eastern	$0	$0	$3	$3	$3
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$2	$2	$2
Western	$0	$0	$1	$1	$1
Subtotal	**$0**	**$0**	**$8**	**$8**	**$8**
Recreation and Amusement					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$1	$1	$1
Eastern	$0	$0	$1	$1	$1
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$1	$1	$1

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Western	$0	$0	$0	$0	$0
Subtotal	**$0**	**$0**	**$3**	**$3**	**$3**
Sanitation and Waste Removal					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$1	$1	$1
Eastern	$0	$0	$1	$1	$1
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$1	$1	$1
Western	$0	$0	$0	$0	$0
Subtotal	**$0**	**$0**	**$2**	**$2**	**$2**
Telecommunications					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$2	$2	$2
Eastern	$0	$0	$2	$2	$2
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$2	$2	$2
Western	$0	$0	$1	$1	$1
Subtotal	**$0**	**$0**	**$8**	**$8**	**$8**
Temporary Help Services					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$1	$1	$1
Eastern	$0	$0	$2	$2	$2
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$1	$1	$1
Western	$0	$0	$1	$1	$1
Subtotal	**$0**	**$0**	**$5**	**$5**	**$5**
Transportation					
Alaskan	$0	$0	$0	$0	$0

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Central	$0	$0	$8	$8	$8
Eastern	$0	$0	$7	$7	$7
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$8	$8	$8
Western	$0	$0	$2	$2	$2
Subtotal	**$0**	**$0**	**$25**	**$25**	**$25**
Utilities					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$1	$1	$1
Eastern	$0	$0	$2	$2	$2
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$2	$2	$2
Western	$0	$0	$1	$1	$1
Subtotal	**$0**	**$0**	**$6**	**$6**	**$6**
Warehousing					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$1	$1	$1
Eastern	$0	$0	$1	$1	$1
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$1	$1	$1
Western	$0	$0	$1	$1	$1
Subtotal	**$0**	**$0**	**$3**	**$3**	**$3**
Non-Core					
Alaskan	$0	$0	$2	$2	$2
Central	$0	$0	$146	$146	$146
Eastern	$0	$0	$121	$121	$121
Pacific	$0	$0	$1	$1	$1
Southern	$0	$0	$59	$59	$59

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Western	$0	$0	$50	$50	$50
Subtotal	**$0**	**$0**	**$380**	**$380**	**$380**
Total Costs for Contact Emergency Medical Services					
Alaskan	$0	$0	$3	$3	$3
Central	$0	$0	$193	$193	$193
Eastern	$0	$0	$174	$174	$174
Pacific	$0	$0	$2	$2	$2
Southern	$0	$0	$110	$110	$110
Western	$0	$0	$72	$72	$72
Total	**$0**	**$0**	**$554**	**$554**	**$554**
Transport Worker					
Agriculture, Forestry, and Fishing					
Alaskan	$0	$0	$1	$1	$1
Central	$0	$0	$67	$67	$67
Eastern	$0	$0	$35	$35	$35
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$61	$61	$61
Western	$0	$0	$9	$9	$9
Subtotal	**$0**	**$0**	**$173**	**$173**	**$173**
Building Materials and Equipment Suppliers					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$15	$15	$15
Eastern	$0	$0	$23	$23	$23
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$21	$21	$21
Western	$0	$0	$13	$13	$13
Subtotal	**$0**	**$0**	**$73**	**$73**	**$73**
Commercial Kitchens					

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$26	$26	$26
Eastern	$0	$0	$43	$43	$43
Pacific	$0	$0	$1	$1	$1
Southern	$0	$0	$31	$31	$31
Western	$0	$0	$22	$22	$22
Subtotal	**$0**	**$0**	**$122**	**$122**	**$122**
Construction					
Alaskan	$0	$0	$2	$2	$2
Central	$0	$0	$127	$127	$127
Eastern	$0	$0	$154	$154	$154
Pacific	$0	$0	$2	$2	$2
Southern	$0	$0	$112	$112	$112
Western	$0	$0	$31	$31	$31
Subtotal	**$0**	**$0**	**$427**	**$427**	**$427**
Drycleaning and Commercial Laundries					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$1	$1	$1
Eastern	$0	$0	$4	$4	$4
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$2	$2	$2
Western	$0	$0	$1	$1	$1
Subtotal	**$0**	**$0**	**$9**	**$9**	**$9**
Landscaping and Facilities Support					
Alaskan	$0	$0	$1	$1	$1
Central	$0	$0	$74	$74	$74
Eastern	$0	$0	$122	$122	$122
Pacific	$0	$0	$2	$2	$2

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Southern	$0	$0	$87	$87	$87
Western	$0	$0	$69	$69	$69
Subtotal	**$0**	**$0**	**$354**	**$354**	**$354**
Maintenance and Repair					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$13	$13	$13
Eastern	$0	$0	$17	$17	$17
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$14	$14	$14
Western	$0	$0	$9	$9	$9
Subtotal	**$0**	**$0**	**$53**	**$53**	**$53**
Manufacturing					
Alaskan	$0	$0	$1	$1	$1
Central	$0	$0	$102	$102	$102
Eastern	$0	$0	$100	$100	$100
Pacific	$0	$0	$1	$1	$1
Southern	$0	$0	$75	$75	$75
Western	$0	$0	$56	$56	$56
Subtotal	**$0**	**$0**	**$334**	**$334**	**$334**
Oil and Gas					
Alaskan	$0	$0	$1	$1	$1
Central	$0	$0	$28	$28	$28
Eastern	$0	$0	$15	$15	$15
Southern	$0	$0	$108	$108	$108
Western	$0	$0	$14	$14	$14
Subtotal	**$0**	**$0**	**$166**	**$166**	**$166**
Postal and Delivery Services					
Alaskan	$0	$0	$1	$1	$1

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Central	$0	$0	$31	$31	$31
Eastern	$0	$0	$39	$39	$39
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$29	$29	$29
Western	$0	$0	$14	$14	$14
Subtotal	**$0**	**$0**	**$113**	**$113**	**$113**
Recreation and Amusement					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$10	$10	$10
Eastern	$0	$0	$16	$16	$16
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$10	$10	$10
Western	$0	$0	$7	$7	$7
Subtotal	**$0**	**$0**	**$43**	**$43**	**$43**
Sanitation and Waste Removal					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$9	$9	$9
Eastern	$0	$0	$13	$13	$13
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$9	$9	$9
Western	$0	$0	$5	$5	$5
Subtotal	**$0**	**$0**	**$36**	**$36**	**$36**
Telecommunications					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$27	$27	$27
Eastern	$0	$0	$37	$37	$37
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$32	$32	$32

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Western	$0	$0	$18	$18	$18
Subtotal	**$0**	**$0**	**$114**	**$114**	**$114**
Temporary Help Services					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$17	$17	$17
Eastern	$0	$0	$25	$25	$25
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$21	$21	$21
Western	$0	$0	$12	$12	$12
Subtotal	**$0**	**$0**	**$76**	**$76**	**$76**
Transportation					
Alaskan	$0	$0	$2	$2	$2
Central	$0	$0	$123	$123	$123
Eastern	$0	$0	$111	$111	$111
Pacific	$0	$0	$1	$1	$1
Southern	$0	$0	$113	$113	$113
Western	$0	$0	$28	$28	$28
Subtotal	**$0**	**$0**	**$379**	**$379**	**$379**
Utilities					
Alaskan	$0	$0	$0	$0	$0
Central	$0	$0	$21	$21	$21
Eastern	$0	$0	$26	$26	$26
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$29	$29	$29
Western	$0	$0	$12	$12	$12
Subtotal	**$0**	**$0**	**$89**	**$89**	**$89**
Warehousing					
Alaskan	$0	$0	$0	$0	$0

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Central	$0	$0	$10	$10	$10
Eastern	$0	$0	$13	$13	$13
Pacific	$0	$0	$0	$0	$0
Southern	$0	$0	$12	$12	$12
Western	$0	$0	$8	$8	$8
Subtotal	**$0**	**$0**	**$43**	**$43**	**$43**
Non-Core					
Alaskan	$0	$0	$36	$36	$36
Central	$0	$0	$2,194	$2,194	$2,194
Eastern	$0	$0	$1,815	$1,815	$1,815
Pacific	$0	$0	$17	$17	$17
Southern	$0	$0	$886	$886	$886
Western	$0	$0	$751	$751	$751
Subtotal	**$0**	**$0**	**$5,699**	**$5,699**	**$5,699**
Total Costs for Transport Worker					
Alaskan	$0	$0	$46	$46	$46
Central	$0	$0	$2,896	$2,896	$2,896
Eastern	$0	$0	$2,606	$2,606	$2,606
Pacific	$0	$0	$27	$27	$27
Southern	$0	$0	$1,652	$1,652	$1,652
Western	$0	$0	$1,079	$1,079	$1,079
Total	**$0**	**$0**	**$8,305**	**$8,305**	**$8,305**
Ice Sheets					
Agriculture, Forestry, and Fishing					
Alaskan	$3,919	$4,363	$0	$3,919	$4,363
Central	$284,403	$316,616	$0	$284,403	$316,616
Eastern	$149,682	$166,636	$0	$149,682	$166,636
Pacific	$2,022	$2,251	$0	$2,022	$2,251

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Southern	$260,013	$289,464	$0	$260,013	$289,464
Western	$38,559	$42,926	$0	$38,559	$42,926
Subtotal	**$738,598**	**$822,255**	**$0**	**$738,598**	**$822,255**
Building Materials and Equipment Suppliers					
Alaskan	$409	$455	$0	$409	$455
Central	$32,691	$36,393	$0	$32,691	$36,393
Eastern	$46,817	$52,120	$0	$46,817	$52,120
Pacific	$741	$825	$0	$741	$825
Southern	$42,659	$47,491	$0	$42,659	$47,491
Western	$25,237	$28,096	$0	$25,237	$28,096
Subtotal	**$148,554**	**$165,380**	**$0**	**$148,554**	**$165,380**
Commercial Kitchens					
Alaskan	$4,919	$5,477	$0	$4,919	$5,477
Central	$392,047	$436,452	$0	$392,047	$436,452
Eastern	$652,643	$726,565	$0	$652,643	$726,565
Pacific	$12,463	$13,875	$0	$12,463	$13,875
Southern	$478,939	$533,186	$0	$478,939	$533,186
Western	$333,020	$370,740	$0	$333,020	$370,740
Subtotal	**$1,874,032**	**$2,086,295**	**$0**	**$1,874,032**	**$2,086,295**
Construction					
Alaskan	$7,015	$7,810	$0	$7,015	$7,810
Central	$538,801	$599,828	$0	$538,801	$599,828
Eastern	$656,231	$730,559	$0	$656,231	$730,559
Pacific	$9,774	$10,881	$0	$9,774	$10,881
Southern	$478,099	$532,251	$0	$478,099	$532,251
Western	$136,369	$151,815	$0	$136,369	$151,815
Subtotal	**$1,826,289**	**$2,033,145**	**$0**	**$1,826,289**	**$2,033,145**
Drycleaning and Commercial Laundries					

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Alaskan	$159	$177	$0	$159	$177
Central	$19,859	$22,109	$0	$19,859	$22,109
Eastern	$51,015	$56,794	$0	$51,015	$56,794
Pacific	$402	$447	$0	$402	$447
Southern	$30,107	$33,517	$0	$30,107	$33,517
Western	$18,521	$20,619	$0	$18,521	$20,619
Subtotal	**$120,063**	**$133,662**	**$0**	**$120,063**	**$133,662**
Landscaping and Facilities Support					
Alaskan	$1,015	$1,130	$0	$1,015	$1,130
Central	$105,516	$117,467	$0	$105,516	$117,467
Eastern	$171,723	$191,173	$0	$171,723	$191,173
Pacific	$2,503	$2,786	$0	$2,503	$2,786
Southern	$120,865	$134,555	$0	$120,865	$134,555
Western	$86,959	$96,809	$0	$86,959	$96,809
Subtotal	**$488,581**	**$543,921**	**$0**	**$488,581**	**$543,921**
Maintenance and Repair					
Alaskan	$1,733	$1,929	$0	$1,733	$1,929
Central	$175,535	$195,417	$0	$175,535	$195,417
Eastern	$232,663	$259,016	$0	$232,663	$259,016
Pacific	$2,796	$3,113	$0	$2,796	$3,113
Southern	$188,980	$210,385	$0	$188,980	$210,385
Western	$121,702	$135,486	$0	$121,702	$135,486
Subtotal	**$723,409**	**$805,346**	**$0**	**$723,409**	**$805,346**
Manufacturing					
Alaskan	$550	$613	$0	$550	$613
Central	$108,365	$120,639	$0	$108,365	$120,639
Eastern	$105,352	$117,284	$0	$105,352	$117,284
Pacific	$841	$936	$0	$841	$936

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Southern	$79,014	$87,964	$0	$79,014	$87,964
Western	$59,634	$66,388	$0	$59,634	$66,388
Subtotal	**$353,755**	**$393,824**	**$0**	**$353,755**	**$393,824**
Oil and Gas					
Alaskan	$784	$873	$0	$784	$873
Central	$31,780	$35,379	$0	$31,780	$35,379
Eastern	$17,148	$19,091	$0	$17,148	$19,091
Southern	$115,134	$128,175	$0	$115,134	$128,175
Western	$15,218	$16,941	$0	$15,218	$16,941
Subtotal	**$180,064**	**$200,459**	**$0**	**$180,064**	**$200,459**
Postal and Delivery Services					
Alaskan	$1,828	$2,035	$0	$1,828	$2,035
Central	$78,479	$87,368	$0	$78,479	$87,368
Eastern	$99,269	$110,513	$0	$99,269	$110,513
Pacific	$1,048	$1,167	$0	$1,048	$1,167
Southern	$73,083	$81,361	$0	$73,083	$81,361
Western	$36,803	$40,972	$0	$36,803	$40,972
Subtotal	**$290,510**	**$323,415**	**$0**	**$290,510**	**$323,415**
Recreation and Amusement					
Alaskan	$2,173	$2,419	$0	$2,173	$2,419
Central	$86,303	$96,078	$0	$86,303	$96,078
Eastern	$129,160	$143,789	$0	$129,160	$143,789
Pacific	$1,602	$1,783	$0	$1,602	$1,783
Southern	$84,110	$93,637	$0	$84,110	$93,637
Western	$56,791	$63,223	$0	$56,791	$63,223
Subtotal	**$360,139**	**$400,930**	**$0**	**$360,139**	**$400,930**
Sanitation and Waste Removal					
Alaskan	$177	$197	$0	$177	$197

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Central	$6,511	$7,249	$0	$6,511	$7,249
Eastern	$9,397	$10,461	$0	$9,397	$10,461
Pacific	$142	$159	$0	$142	$159
Southern	$6,819	$7,591	$0	$6,819	$7,591
Western	$3,557	$3,960	$0	$3,557	$3,960
Subtotal	**$26,604**	**$29,617**	**$0**	**$26,604**	**$29,617**
Telecommunications					
Alaskan	$244	$271	$0	$244	$271
Central	$14,806	$16,483	$0	$14,806	$16,483
Eastern	$20,265	$22,560	$0	$20,265	$22,560
Pacific	$221	$246	$0	$221	$246
Southern	$17,801	$19,818	$0	$17,801	$19,818
Western	$9,937	$11,063	$0	$9,937	$11,063
Subtotal	**$63,274**	**$70,441**	**$0**	**$63,274**	**$70,441**
Temporary Help Services					
Alaskan	$69	$76	$0	$69	$76
Central	$12,968	$14,437	$0	$12,968	$14,437
Eastern	$18,273	$20,343	$0	$18,273	$20,343
Pacific	$175	$195	$0	$175	$195
Southern	$15,516	$17,274	$0	$15,516	$17,274
Western	$9,194	$10,236	$0	$9,194	$10,236
Subtotal	**$56,196**	**$62,561**	**$0**	**$56,196**	**$62,561**
Transportation					
Alaskan	$5,154	$5,738	$0	$5,154	$5,738
Central	$315,763	$351,528	$0	$315,763	$351,528
Eastern	$284,254	$316,450	$0	$284,254	$316,450
Pacific	$3,541	$3,942	$0	$3,541	$3,942
Southern	$289,153	$321,904	$0	$289,153	$321,904

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Western	$71,295	$79,371	$0	$71,295	$79,371
Subtotal	**$969,160**	**$1,078,933**	**$0**	**$969,160**	**$1,078,933**
Utilities					
Alaskan	$783	$872	$0	$783	$872
Central	$33,502	$37,297	$0	$33,502	$37,297
Eastern	$41,998	$46,755	$0	$41,998	$46,755
Pacific	$288	$320	$0	$288	$320
Southern	$47,105	$52,440	$0	$47,105	$52,440
Western	$19,317	$21,505	$0	$19,317	$21,505
Subtotal	**$142,993**	**$159,189**	**$0**	**$142,993**	**$159,189**
Warehousing					
Alaskan	$175	$194	$0	$175	$194
Central	$25,535	$28,427	$0	$25,535	$28,427
Eastern	$32,288	$35,945	$0	$32,288	$35,945
Pacific	$410	$456	$0	$410	$456
Southern	$31,697	$35,287	$0	$31,697	$35,287
Western	$19,910	$22,165	$0	$19,910	$22,165
Subtotal	**$110,014**	**$122,475**	**$0**	**$110,014**	**$122,475**
Non-Core					
Alaskan	$31,903	$35,517	$0	$31,903	$35,517
Central	$2,345,882	$2,611,589	$0	$2,345,882	$2,611,589
Eastern	$3,852,103	$4,288,412	$0	$3,852,103	$4,288,412
Pacific	$60,769	$67,652	$0	$60,769	$67,652
Southern	$3,037,027	$3,381,017	$0	$3,037,027	$3,381,017
Western	$1,978,080	$2,202,128	$0	$1,978,080	$2,202,128
Subtotal	**$11,305,765**	**$12,586,315**	**$0**	**$11,305,765**	**$12,586,315**
Total Costs for Ice Sheets					
Alaskan	$63,010	$70,146	$0	$63,010	$70,146

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Central	$4,608,745	$5,130,756	$0	$4,608,745	$5,130,756
Eastern	$6,570,282	$7,314,467	$0	$6,570,282	$7,314,467
Pacific	$99,738	$111,034	$0	$99,738	$111,034
Southern	$5,396,123	$6,007,317	$0	$5,396,123	$6,007,317
Western	$3,040,103	$3,384,441	$0	$3,040,103	$3,384,441
Total	**$19,778,001**	**$22,018,161**	**$0**	**$19,778,001**	**$22,018,161**
Ice					
Agriculture, Forestry, and Fishing					
Alaskan	$0	$0	$446	$446	$446
Central	$0	$0	$5,904,480	$5,904,480	$5,904,480
Eastern	$0	$0	$3,256,910	$3,256,910	$3,256,910
Pacific	$0	$0	$145,592	$145,592	$145,592
Southern	$0	$0	$13,828,413	$13,828,413	$13,828,413
Western	$0	$0	$984,176	$984,176	$984,176
Subtotal	**$0**	**$0**	**$24,120,016**	**$24,120,016**	**$24,120,016**
Building Materials and Equipment Suppliers					
Alaskan	$0	$0	$46	$46	$46
Central	$0	$0	$647,575	$647,575	$647,575
Eastern	$0	$0	$912,708	$912,708	$912,708
Pacific	$0	$0	$53,375	$53,375	$53,375
Southern	$0	$0	$2,568,554	$2,568,554	$2,568,554
Western	$0	$0	$670,491	$670,491	$670,491
Subtotal	**$0**	**$0**	**$4,852,749**	**$4,852,749**	**$4,852,749**
Commercial Kitchens					
Alaskan	$0	$0	$559	$559	$559
Central	$0	$0	$7,717,626	$7,717,626	$7,717,626
Eastern	$0	$0	$12,712,137	$12,712,137	$12,712,137
Pacific	$0	$0	$897,553	$897,553	$897,553

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Southern	$0	$0	$28,462,002	$28,462,002	$28,462,002
Western	$0	$0	$8,930,719	$8,930,719	$8,930,719
Subtotal	**$0**	**$0**	**$58,720,595**	**$58,720,595**	**$58,720,595**
Construction					
Alaskan	$0	$0	$797	$797	$797
Central	$0	$0	$9,565,873	$9,565,873	$9,565,873
Eastern	$0	$0	$12,957,020	$12,957,020	$12,957,020
Pacific	$0	$0	$703,866	$703,866	$703,866
Southern	$0	$0	$28,772,465	$28,772,465	$28,772,465
Western	$0	$0	$4,062,547	$4,062,547	$4,062,547
Subtotal	**$0**	**$0**	**$56,062,569**	**$56,062,569**	**$56,062,569**
Drycleaning and Commercial Laundries					
Alaskan	$0	$0	$18	$18	$18
Central	$0	$0	$396,549	$396,549	$396,549
Eastern	$0	$0	$954,226	$954,226	$954,226
Pacific	$0	$0	$28,916	$28,916	$28,916
Southern	$0	$0	$1,772,663	$1,772,663	$1,772,663
Western	$0	$0	$490,895	$490,895	$490,895
Subtotal	**$0**	**$0**	**$3,643,268**	**$3,643,268**	**$3,643,268**
Landscaping and Facilities Support					
Alaskan	$0	$0	$115	$115	$115
Central	$0	$0	$2,084,690	$2,084,690	$2,084,690
Eastern	$0	$0	$3,394,782	$3,394,782	$3,394,782
Pacific	$0	$0	$180,238	$180,238	$180,238
Southern	$0	$0	$7,349,405	$7,349,405	$7,349,405
Western	$0	$0	$2,327,639	$2,327,639	$2,327,639
Subtotal	**$0**	**$0**	**$15,336,869**	**$15,336,869**	**$15,336,869**
Maintenance and Repair					

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Alaskan	$0	$0	$197	$197	$197
Central	$0	$0	$3,446,620	$3,446,620	$3,446,620
Eastern	$0	$0	$4,631,181	$4,631,181	$4,631,181
Pacific	$0	$0	$201,369	$201,369	$201,369
Southern	$0	$0	$11,236,731	$11,236,731	$11,236,731
Western	$0	$0	$3,270,460	$3,270,460	$3,270,460
Subtotal	**$0**	**$0**	**$22,786,559**	**$22,786,559**	**$22,786,559**
Manufacturing					
Alaskan	$0	$0	$63	$63	$63
Central	$0	$0	$1,878,565	$1,878,565	$1,878,565
Eastern	$0	$0	$2,043,899	$2,043,899	$2,043,899
Pacific	$0	$0	$60,540	$60,540	$60,540
Southern	$0	$0	$4,507,111	$4,507,111	$4,507,111
Western	$0	$0	$1,570,311	$1,570,311	$1,570,311
Subtotal	**$0**	**$0**	**$10,060,489**	**$10,060,489**	**$10,060,489**
Oil and Gas					
Alaskan	$0	$0	$89	$89	$89
Central	$0	$0	$679,900	$679,900	$679,900
Eastern	$0	$0	$310,644	$310,644	$310,644
Southern	$0	$0	$6,186,305	$6,186,305	$6,186,305
Western	$0	$0	$322,752	$322,752	$322,752
Subtotal	**$0**	**$0**	**$7,499,690**	**$7,499,690**	**$7,499,690**
Postal and Delivery Services					
Alaskan	$0	$0	$208	$208	$208
Central	$0	$0	$1,592,194	$1,592,194	$1,592,194
Eastern	$0	$0	$1,908,549	$1,908,549	$1,908,549
Pacific	$0	$0	$75,491	$75,491	$75,491
Southern	$0	$0	$3,900,095	$3,900,095	$3,900,095

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Western	$0	$0	$957,348	$957,348	$957,348
Subtotal	**$0**	**$0**	**$8,433,885**	**$8,433,885**	**$8,433,885**
Recreation and Amusement					
Alaskan	$0	$0	$247	$247	$247
Central	$0	$0	$1,656,570	$1,656,570	$1,656,570
Eastern	$0	$0	$2,519,069	$2,519,069	$2,519,069
Pacific	$0	$0	$115,370	$115,370	$115,370
Southern	$0	$0	$4,946,955	$4,946,955	$4,946,955
Western	$0	$0	$1,503,157	$1,503,157	$1,503,157
Subtotal	**$0**	**$0**	**$10,741,370**	**$10,741,370**	**$10,741,370**
Sanitation and Waste Removal					
Alaskan	$0	$0	$20	$20	$20
Central	$0	$0	$125,786	$125,786	$125,786
Eastern	$0	$0	$183,236	$183,236	$183,236
Pacific	$0	$0	$10,260	$10,260	$10,260
Southern	$0	$0	$390,745	$390,745	$390,745
Western	$0	$0	$96,609	$96,609	$96,609
Subtotal	**$0**	**$0**	**$806,655**	**$806,655**	**$806,655**
Telecommunications					
Alaskan	$0	$0	$28	$28	$28
Central	$0	$0	$296,733	$296,733	$296,733
Eastern	$0	$0	$407,173	$407,173	$407,173
Pacific	$0	$0	$15,899	$15,899	$15,899
Southern	$0	$0	$997,075	$997,075	$997,075
Western	$0	$0	$267,246	$267,246	$267,246
Subtotal	**$0**	**$0**	**$1,984,154**	**$1,984,154**	**$1,984,154**
Temporary Help Services					
Alaskan	$0	$0	$8	$8	$8

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Central	$0	$0	$249,978	$249,978	$249,978
Eastern	$0	$0	$371,092	$371,092	$371,092
Pacific	$0	$0	$12,610	$12,610	$12,610
Southern	$0	$0	$896,743	$896,743	$896,743
Western	$0	$0	$253,049	$253,049	$253,049
Subtotal	**$0**	**$0**	**$1,783,480**	**$1,783,480**	**$1,783,480**
Transportation					
Alaskan	$0	$0	$586	$586	$586
Central	$0	$0	$6,347,834	$6,347,834	$6,347,834
Eastern	$0	$0	$5,777,439	$5,777,439	$5,777,439
Pacific	$0	$0	$255,024	$255,024	$255,024
Southern	$0	$0	$16,735,409	$16,735,409	$16,735,409
Western	$0	$0	$2,032,671	$2,032,671	$2,032,671
Subtotal	**$0**	**$0**	**$31,148,963**	**$31,148,963**	**$31,148,963**
Utilities					
Alaskan	$0	$0	$89	$89	$89
Central	$0	$0	$676,799	$676,799	$676,799
Eastern	$0	$0	$880,610	$880,610	$880,610
Pacific	$0	$0	$20,720	$20,720	$20,720
Southern	$0	$0	$2,564,705	$2,564,705	$2,564,705
Western	$0	$0	$498,202	$498,202	$498,202
Subtotal	**$0**	**$0**	**$4,641,124**	**$4,641,124**	**$4,641,124**
Warehousing					
Alaskan	$0	$0	$20	$20	$20
Central	$0	$0	$517,417	$517,417	$517,417
Eastern	$0	$0	$684,456	$684,456	$684,456
Pacific	$0	$0	$29,519	$29,519	$29,519
Southern	$0	$0	$1,745,873	$1,745,873	$1,745,873

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Western	$0	$0	$539,749	$539,749	$539,749
Subtotal	**$0**	**$0**	**$3,517,034**	**$3,517,034**	**$3,517,034**
Non-Core					
Alaskan	$0	$0	$3,627	$3,627	$3,627
Central	$0	$0	$47,433,999	$47,433,999	$47,433,999
Eastern	$0	$0	$76,037,869	$76,037,869	$76,037,869
Pacific	$0	$0	$4,376,294	$4,376,294	$4,376,294
Southern	$0	$0	$178,850,258	$178,850,258	$178,850,258
Western	$0	$0	$52,965,329	$52,965,329	$52,965,329
Subtotal	**$0**	**$0**	**$359,667,375**	**$359,667,375**	**$359,667,375**
Total Costs for Ice					
Alaskan	$0	$0	$7,163	$7,163	$7,163
Central	$0	$0	$91,219,187	$91,219,187	$91,219,187
Eastern	$0	$0	$129,943,000	$129,943,000	$129,943,000
Pacific	$0	$0	$7,182,636	$7,182,636	$7,182,636
Southern	$0	$0	$315,711,506	$315,711,506	$315,711,506
Western	$0	$0	$81,743,351	$81,743,351	$81,743,351
Total	**$0**	**$0**	**$625,806,844**	**$625,806,844**	**$625,806,844**
Ice Cooler					
Agriculture, Forestry, and Fishing					
Alaskan	$1,555	$1,731	$0	$1,555	$1,731
Central	$112,807	$125,585	$0	$112,807	$125,585
Eastern	$59,371	$66,096	$0	$59,371	$66,096
Pacific	$802	$893	$0	$802	$893
Southern	$103,133	$114,815	$0	$103,133	$114,815
Western	$15,294	$17,027	$0	$15,294	$17,027
Subtotal	**$292,962**	**$326,145**	**$0**	**$292,962**	**$326,145**
Building Materials and Equipment Suppliers					

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Alaskan	$162	$180	$0	$162	$180
Central	$12,967	$14,435	$0	$12,967	$14,435
Eastern	$18,570	$20,673	$0	$18,570	$20,673
Pacific	$294	$327	$0	$294	$327
Southern	$16,921	$18,837	$0	$16,921	$18,837
Western	$10,010	$11,144	$0	$10,010	$11,144
Subtotal	**$58,923**	**$65,597**	**$0**	**$58,923**	**$65,597**
Commercial Kitchens					
Alaskan	$1,951	$2,172	$0	$1,951	$2,172
Central	$155,504	$173,117	$0	$155,504	$173,117
Eastern	$258,869	$288,189	$0	$258,869	$288,189
Pacific	$4,944	$5,503	$0	$4,944	$5,503
Southern	$189,970	$211,487	$0	$189,970	$211,487
Western	$132,091	$147,053	$0	$132,091	$147,053
Subtotal	**$743,329**	**$827,522**	**$0**	**$743,329**	**$827,522**
Construction					
Alaskan	$2,783	$3,098	$0	$2,783	$3,098
Central	$213,714	$237,920	$0	$213,714	$237,920
Eastern	$260,292	$289,774	$0	$260,292	$289,774
Pacific	$3,877	$4,316	$0	$3,877	$4,316
Southern	$189,636	$211,116	$0	$189,636	$211,116
Western	$54,090	$60,217	$0	$54,090	$60,217
Subtotal	**$724,392**	**$806,440**	**$0**	**$724,392**	**$806,440**
Drycleaning and Commercial Laundries					
Alaskan	$63	$70	$0	$63	$70
Central	$7,877	$8,769	$0	$7,877	$8,769
Eastern	$20,235	$22,527	$0	$20,235	$22,527
Pacific	$159	$177	$0	$159	$177

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Southern	$11,942	$13,294	$0	$11,942	$13,294
Western	$7,346	$8,178	$0	$7,346	$8,178
Subtotal	**$47,623**	**$53,017**	**$0**	**$47,623**	**$53,017**
Landscaping and Facilities Support					
Alaskan	$403	$448	$0	$403	$448
Central	$41,853	$46,593	$0	$41,853	$46,593
Eastern	$68,113	$75,828	$0	$68,113	$75,828
Pacific	$993	$1,105	$0	$993	$1,105
Southern	$47,941	$53,371	$0	$47,941	$53,371
Western	$34,492	$38,399	$0	$34,492	$38,399
Subtotal	**$193,794**	**$215,744**	**$0**	**$193,794**	**$215,744**
Maintenance and Repair					
Alaskan	$687	$765	$0	$687	$765
Central	$69,625	$77,511	$0	$69,625	$77,511
Eastern	$92,285	$102,738	$0	$92,285	$102,738
Pacific	$1,109	$1,235	$0	$1,109	$1,235
Southern	$74,958	$83,449	$0	$74,958	$83,449
Western	$48,273	$53,740	$0	$48,273	$53,740
Subtotal	**$286,938**	**$319,438**	**$0**	**$286,938**	**$319,438**
Manufacturing					
Alaskan	$218	$243	$0	$218	$243
Central	$42,983	$47,851	$0	$42,983	$47,851
Eastern	$41,787	$46,520	$0	$41,787	$46,520
Pacific	$333	$371	$0	$333	$371
Southern	$31,341	$34,890	$0	$31,341	$34,890
Western	$23,653	$26,333	$0	$23,653	$26,333
Subtotal	**$140,316**	**$156,209**	**$0**	**$140,316**	**$156,209**
Oil and Gas					

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Alaskan	$311	$346	$0	$311	$346
Central	$12,605	$14,033	$0	$12,605	$14,033
Eastern	$6,802	$7,572	$0	$6,802	$7,572
Southern	$45,668	$50,840	$0	$45,668	$50,840
Western	$6,036	$6,720	$0	$6,036	$6,720
Subtotal	**$71,422**	**$79,512**	**$0**	**$71,422**	**$79,512**
Postal and Delivery Services					
Alaskan	$725	$807	$0	$725	$807
Central	$31,128	$34,654	$0	$31,128	$34,654
Eastern	$39,375	$43,835	$0	$39,375	$43,835
Pacific	$416	$463	$0	$416	$463
Southern	$28,988	$32,271	$0	$28,988	$32,271
Western	$14,598	$16,251	$0	$14,598	$16,251
Subtotal	**$115,230**	**$128,281**	**$0**	**$115,230**	**$128,281**
Recreation and Amusement					
Alaskan	$862	$960	$0	$862	$960
Central	$34,232	$38,109	$0	$34,232	$38,109
Eastern	$51,231	$57,034	$0	$51,231	$57,034
Pacific	$635	$707	$0	$635	$707
Southern	$33,362	$37,141	$0	$33,362	$37,141
Western	$22,526	$25,077	$0	$22,526	$25,077
Subtotal	**$142,848**	**$159,027**	**$0**	**$142,848**	**$159,027**
Sanitation and Waste Removal					
Alaskan	$70	$78	$0	$70	$78
Central	$2,583	$2,875	$0	$2,583	$2,875
Eastern	$3,727	$4,149	$0	$3,727	$4,149
Pacific	$57	$63	$0	$57	$63
Southern	$2,705	$3,011	$0	$2,705	$3,011

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Western	$1,411	$1,571	$0	$1,411	$1,571
Subtotal	**$10,552**	**$11,748**	**$0**	**$10,552**	**$11,748**
Telecommunications					
Alaskan	$97	$108	$0	$97	$108
Central	$5,873	$6,538	$0	$5,873	$6,538
Eastern	$8,038	$8,948	$0	$8,038	$8,948
Pacific	$88	$97	$0	$88	$97
Southern	$7,061	$7,861	$0	$7,061	$7,861
Western	$3,942	$4,388	$0	$3,942	$4,388
Subtotal	**$25,097**	**$27,940**	**$0**	**$25,097**	**$27,940**
Temporary Help Services					
Alaskan	$27	$30	$0	$27	$30
Central	$5,144	$5,726	$0	$5,144	$5,726
Eastern	$7,248	$8,069	$0	$7,248	$8,069
Pacific	$69	$77	$0	$69	$77
Southern	$6,155	$6,852	$0	$6,155	$6,852
Western	$3,647	$4,060	$0	$3,647	$4,060
Subtotal	**$22,290**	**$24,815**	**$0**	**$22,290**	**$24,815**
Transportation					
Alaskan	$2,044	$2,276	$0	$2,044	$2,276
Central	$125,246	$139,432	$0	$125,246	$139,432
Eastern	$112,749	$125,519	$0	$112,749	$125,519
Pacific	$1,405	$1,564	$0	$1,405	$1,564
Southern	$114,692	$127,682	$0	$114,692	$127,682
Western	$28,279	$31,482	$0	$28,279	$31,482
Subtotal	**$384,414**	**$427,955**	**$0**	**$384,414**	**$427,955**
Utilities					
Alaskan	$311	$346	$0	$311	$346

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Central	$13,289	$14,794	$0	$13,289	$14,794
Eastern	$16,658	$18,545	$0	$16,658	$18,545
Pacific	$114	$127	$0	$114	$127
Southern	$18,684	$20,800	$0	$18,684	$20,800
Western	$7,662	$8,530	$0	$7,662	$8,530
Subtotal	**$56,718**	**$63,142**	**$0**	**$56,718**	**$63,142**
Warehousing					
Alaskan	$69	$77	$0	$69	$77
Central	$10,128	$11,275	$0	$10,128	$11,275
Eastern	$12,807	$14,257	$0	$12,807	$14,257
Pacific	$163	$181	$0	$163	$181
Southern	$12,572	$13,996	$0	$12,572	$13,996
Western	$7,897	$8,792	$0	$7,897	$8,792
Subtotal	**$43,637**	**$48,579**	**$0**	**$43,637**	**$48,579**
Non-Core					
Alaskan	$12,654	$14,088	$0	$12,654	$14,088
Central	$930,486	$1,035,878	$0	$930,486	$1,035,878
Eastern	$1,527,924	$1,700,984	$0	$1,527,924	$1,700,984
Pacific	$24,104	$26,834	$0	$24,104	$26,834
Southern	$1,204,627	$1,341,069	$0	$1,204,627	$1,341,069
Western	$784,599	$873,467	$0	$784,599	$873,467
Subtotal	**$4,484,394**	**$4,992,320**	**$0**	**$4,484,394**	**$4,992,320**
Total Costs for Ice Cooler					
Alaskan	$24,993	$27,823	$0	$24,993	$27,823
Central	$1,828,043	$2,035,097	$0	$1,828,043	$2,035,097
Eastern	$2,606,080	$2,901,259	$0	$2,606,080	$2,901,259
Pacific	$39,561	$44,041	$0	$39,561	$44,041
Southern	$2,140,354	$2,382,782	$0	$2,140,354	$2,382,782

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Western	$1,205,847	$1,342,427	$0	$1,205,847	$1,342,427
Total	**$7,844,878**	**$8,733,430**	**$0**	**$7,844,878**	**$8,733,430**
Total Costs for Heat Illness and Emergency Response and Planning					
Agriculture, Forestry, and Fishing					
Alaskan	$5,474	$6,094	$468	$5,942	$6,562
Central	$397,210	$442,200	$5,906,140	$6,303,350	$6,348,340
Eastern	$209,053	$232,732	$3,257,783	$3,466,836	$3,490,515
Pacific	$2,824	$3,143	$145,604	$148,427	$148,747
Southern	$363,147	$404,279	$13,829,931	$14,193,078	$14,234,210
Western	$53,853	$59,953	$984,402	$1,038,255	$1,044,354
Subtotal	**$1,031,560**	**$1,148,400**	**$24,124,328**	**$25,155,888**	**$25,272,728**
Building Materials and Equipment Suppliers					
Alaskan	$571	$635	$51	$622	$686
Central	$45,657	$50,828	$647,987	$693,644	$698,815
Eastern	$65,387	$72,793	$913,350	$978,737	$986,143
Pacific	$1,035	$1,152	$53,385	$54,421	$54,538
Southern	$59,579	$66,328	$2,569,128	$2,628,707	$2,635,456
Western	$35,248	$39,240	$670,853	$706,100	$710,093
Subtotal	**$207,477**	**$230,977**	**$4,854,754**	**$5,062,231**	**$5,085,731**
Commercial Kitchens					
Alaskan	$6,871	$7,649	$568	$7,438	$8,216
Central	$547,551	$609,570	$7,718,320	$8,265,871	$8,327,889
Eastern	$911,512	$1,014,754	$12,713,298	$13,624,809	$13,728,052
Pacific	$17,407	$19,379	$897,577	$914,984	$916,955
Southern	$668,909	$744,673	$28,462,838	$29,131,747	$29,207,511
Western	$465,111	$517,792	$8,931,312	$9,396,424	$9,449,105
Subtotal	**$2,617,361**	**$2,913,817**	**$58,723,912**	**$61,341,273**	**$61,637,729**
Construction					

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Alaskan	$9,798	$10,908	$839	$10,637	$11,746
Central	$752,515	$837,748	$9,569,076	$10,321,590	$10,406,824
Eastern	$916,523	$1,020,333	$12,960,902	$13,877,425	$13,981,235
Pacific	$13,651	$15,197	$703,923	$717,574	$719,120
Southern	$667,736	$743,367	$28,775,279	$29,443,015	$29,518,646
Western	$190,459	$212,032	$4,063,319	$4,253,778	$4,275,350
Subtotal	**$2,550,681**	**$2,839,585**	**$56,073,337**	**$58,624,018**	**$58,912,922**
Drycleaning and Commercial Laundries					
Alaskan	$222	$247	$18	$241	$266
Central	$27,736	$30,878	$396,589	$424,325	$427,467
Eastern	$71,250	$79,320	$954,328	$1,025,579	$1,033,649
Pacific	$561	$624	$28,917	$29,477	$29,541
Southern	$42,049	$46,812	$1,772,724	$1,814,773	$1,819,536
Western	$25,867	$28,797	$490,932	$516,799	$519,729
Subtotal	**$167,685**	**$186,678**	**$3,643,509**	**$3,811,195**	**$3,830,188**
Landscaping and Facilities Support					
Alaskan	$1,418	$1,579	$139	$1,557	$1,718
Central	$147,368	$164,060	$2,086,628	$2,233,996	$2,250,688
Eastern	$239,837	$267,002	$3,397,985	$3,637,822	$3,664,987
Pacific	$3,495	$3,891	$180,281	$183,777	$184,172
Southern	$168,806	$187,926	$7,351,688	$7,520,494	$7,539,613
Western	$121,451	$135,207	$2,329,439	$2,450,890	$2,464,646
Subtotal	**$682,376**	**$759,665**	**$15,346,160**	**$16,028,535**	**$16,105,825**
Maintenance and Repair					
Alaskan	$2,420	$2,694	$200	$2,620	$2,895
Central	$245,160	$272,928	$3,446,973	$3,692,133	$3,719,902
Eastern	$324,948	$361,754	$4,631,648	$4,956,597	$4,993,402
Pacific	$3,905	$4,348	$201,375	$205,280	$205,722

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Southern	$263,939	$293,834	$11,237,111	$11,501,050	$11,530,945
Western	$169,974	$189,226	$3,270,705	$3,440,679	$3,459,931
Subtotal	**$1,010,347**	**$1,124,784**	**$22,788,013**	**$23,798,360**	**$23,912,797**
Manufacturing					
Alaskan	$768	$856	$77	$845	$932
Central	$151,348	$168,490	$1,881,334	$2,032,682	$2,049,825
Eastern	$147,139	$163,805	$2,046,592	$2,193,731	$2,210,396
Pacific	$1,174	$1,307	$60,562	$61,736	$61,869
Southern	$110,355	$122,854	$4,509,130	$4,619,485	$4,631,984
Western	$83,287	$92,721	$1,571,835	$1,655,122	$1,664,556
Subtotal	**$494,071**	**$550,032**	**$10,069,529**	**$10,563,601**	**$10,619,562**
Oil and Gas					
Alaskan	$1,095	$1,219	$108	$1,202	$1,326
Central	$44,385	$49,412	$680,613	$724,998	$730,025
Eastern	$23,950	$26,663	$311,017	$334,968	$337,681
Southern	$160,802	$179,015	$6,189,011	$6,349,813	$6,368,027
Western	$21,254	$23,661	$323,109	$344,363	$346,770
Subtotal	**$251,486**	**$279,971**	**$7,503,858**	**$7,755,344**	**$7,783,829**
Postal and Delivery Services					
Alaskan	$2,553	$2,842	$227	$2,780	$3,069
Central	$109,607	$122,022	$1,593,038	$1,702,645	$1,715,060
Eastern	$138,644	$154,348	$1,909,617	$2,048,261	$2,063,965
Pacific	$1,464	$1,630	$75,502	$76,966	$77,132
Southern	$102,071	$113,632	$3,900,882	$4,002,953	$4,014,514
Western	$51,401	$57,223	$957,744	$1,009,145	$1,014,967
Subtotal	**$405,740**	**$451,696**	**$8,437,011**	**$8,842,751**	**$8,888,707**
Recreation and Amusement					
Alaskan	$3,035	$3,379	$254	$3,289	$3,632

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Central	$120,534	$134,187	$1,656,853	$1,777,387	$1,791,040
Eastern	$180,391	$200,823	$2,519,494	$2,699,885	$2,720,317
Pacific	$2,237	$2,491	$115,376	$117,613	$117,866
Southern	$117,472	$130,778	$4,947,232	$5,064,704	$5,078,010
Western	$79,316	$88,300	$1,503,343	$1,582,659	$1,591,643
Subtotal	**$502,986**	**$559,957**	**$10,742,550**	**$11,245,537**	**$11,302,508**
Sanitation and Waste Removal					
Alaskan	$248	$276	$26	$274	$302
Central	$9,094	$10,124	$126,016	$135,110	$136,140
Eastern	$13,124	$14,610	$183,568	$196,691	$198,178
Pacific	$199	$222	$10,265	$10,464	$10,487
Southern	$9,524	$10,603	$390,986	$400,510	$401,588
Western	$4,968	$5,531	$96,734	$101,703	$102,266
Subtotal	**$37,157**	**$41,365**	**$807,595**	**$844,752**	**$848,960**
Telecommunications					
Alaskan	$340	$379	$40	$380	$419
Central	$20,679	$23,021	$297,469	$318,148	$320,490
Eastern	$28,303	$31,508	$408,180	$436,483	$439,688
Pacific	$308	$343	$15,910	$16,219	$16,254
Southern	$24,862	$27,678	$997,959	$1,022,821	$1,025,637
Western	$13,879	$15,451	$267,740	$281,618	$283,190
Subtotal	**$88,371**	**$98,381**	**$1,987,297**	**$2,075,668**	**$2,085,678**
Temporary Help Services					
Alaskan	$96	$107	$10	$106	$117
Central	$18,112	$20,163	$250,436	$268,548	$270,600
Eastern	$25,521	$28,412	$371,738	$397,259	$400,150
Pacific	$245	$272	$12,616	$12,861	$12,888
Southern	$21,671	$24,125	$897,291	$918,962	$921,417

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Western	$12,841	$14,296	$253,374	$266,215	$267,669
Subtotal	**$78,486**	**$87,376**	**$1,785,465**	**$1,863,951**	**$1,872,841**
Transportation					
Alaskan	$7,198	$8,014	$641	$7,840	$8,655
Central	$441,009	$490,960	$6,351,231	$6,792,240	$6,842,191
Eastern	$397,003	$441,969	$5,780,498	$6,177,501	$6,222,468
Pacific	$4,946	$5,506	$255,062	$260,008	$260,568
Southern	$403,844	$449,586	$16,738,520	$17,142,365	$17,188,106
Western	$99,574	$110,853	$2,033,438	$2,133,012	$2,144,291
Subtotal	**$1,353,575**	**$1,506,888**	**$31,159,391**	**$32,512,966**	**$32,666,279**
Utilities					
Alaskan	$1,094	$1,218	$103	$1,196	$1,320
Central	$46,791	$52,091	$677,376	$724,167	$729,467
Eastern	$58,656	$65,300	$881,334	$939,991	$946,634
Pacific	$402	$447	$20,725	$21,126	$21,172
Southern	$65,789	$73,240	$2,565,516	$2,631,305	$2,638,757
Western	$26,979	$30,034	$498,535	$525,513	$528,569
Subtotal	**$199,711**	**$222,331**	**$4,643,589**	**$4,843,299**	**$4,865,920**
Warehousing					
Alaskan	$244	$272	$22	$266	$293
Central	$35,663	$39,702	$517,691	$553,354	$557,394
Eastern	$45,095	$50,202	$684,804	$729,898	$735,006
Pacific	$572	$637	$29,523	$30,096	$30,161
Southern	$44,269	$49,283	$1,746,214	$1,790,483	$1,795,497
Western	$27,808	$30,957	$539,964	$567,771	$570,921
Subtotal	**$153,651**	**$171,054**	**$3,518,218**	**$3,671,869**	**$3,689,272**
Non-Core					
Alaskan	$44,558	$49,605	$4,634	$49,191	$54,238

Table VIII.C.26. Total Costs – Heat Illness and Emergency Response and Planning (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Central	$3,276,369	$3,647,467	$47,494,625	$50,770,993	$51,142,092
Eastern	$5,380,026	$5,989,397	$76,087,725	$81,467,752	$82,077,122
Pacific	$84,873	$94,486	$4,376,753	$4,461,626	$4,471,239
Southern	$4,241,654	$4,722,086	$178,874,407	$183,116,060	$183,596,492
Western	$2,762,679	$3,075,595	$52,985,853	$55,748,532	$56,061,448
Subtotal	**$15,790,158**	**$17,578,635**	**$359,823,997**	**$375,614,155**	**$377,402,632**
Total					
Alaskan	$88,002	$97,970	$8,424	$96,426	$106,394
Central	$6,436,788	$7,165,853	$91,298,395	$97,735,184	$98,464,248
Eastern	$9,176,362	$10,215,726	$130,013,862	$139,190,225	$140,229,588
Pacific	$139,298	$155,076	$7,183,357	$7,322,655	$7,338,433
Southern	$7,536,477	$8,390,099	$315,755,847	$323,292,325	$324,145,946
Western	$4,245,950	$4,726,869	$81,772,629	$86,018,579	$86,499,498
Total	**$27,622,878**	**$30,751,591**	**$626,032,515**	**$653,655,393**	**$656,784,106**

Source: OSHA estimate.

Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

G. Training.

All affected establishments would be required to provide training on heat-related hazards to at-risk workers and designated persons both upon promulgation and periodically thereafter.[82] OSHA calculates the total costs of each training requirement by either multiplying the number of affected establishments by the corresponding unit costs or multiplying the number of affected employees by the corresponding unit costs. The unit costs to undergo employee trainings (initial, annual refresher, and supplemental) are employee-based and are combined with the number of affected employees. All other training-related unit costs are establishment-based (developing, preparing, conducting employee training (initial, annual refresher, supplemental) and supervisor training (initial, annual refresher)) and are combined with the number of affected establishments. OSHA assumes that one percent of affected establishments would incur the establishment-based cost of supplemental trainings annually. Additionally, OSHA assumes employers would incur the cost of providing supplemental training to one percent of employees annually.

Table VIII.C.27. shows the annualized one-time, annual, and total annualized costs for each of these requirements by industry category, discounted (2 percent over a 10-year period) and undiscounted.

[82] Employers would be required to conduct refresher trainings annually for both at-risk workers and designated persons. Supplemental trainings would also be required for at-risk workers when either (1) worker(s) heat exposure changes, (2) policies and procedures change, (3) worker(s) does not retain information, or (4) a heat-related injury or illness occurs that results in death, days away from work, medical treatment beyond first aid, or loss of consciousness.

Table VIII.C.27. Total Costs – Training (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Initial Employee Training Development					
Agriculture, Forestry, and Fishing	$874,213	$973,231	$0	$874,213	$973,231
Building Materials and Equipment Suppliers	$196,858	$219,155	$0	$196,858	$219,155
Commercial Kitchens	$1,551,304	$1,727,013	$0	$1,551,304	$1,727,013
Construction	$3,520,999	$3,919,806	$0	$3,520,999	$3,919,806
Drycleaning and Commercial Laundries	$161,955	$180,299	$0	$161,955	$180,299
Landscaping and Facilities Support	$661,920	$736,893	$0	$661,920	$736,893
Maintenance and Repair	$965,373	$1,074,716	$0	$965,373	$1,074,716
Manufacturing	$687,852	$765,762	$0	$687,852	$765,762
Oil and Gas	$356,567	$396,953	$0	$356,567	$396,953
Postal and Delivery Services	$429,895	$478,587	$0	$429,895	$478,587
Recreation and Amusement	$404,065	$449,832	$0	$404,065	$449,832
Sanitation and Waste Removal	$36,316	$40,430	$0	$36,316	$40,430
Telecommunications	$138,034	$153,668	$0	$138,034	$153,668
Temporary Help Services	$77,023	$85,747	$0	$77,023	$85,747
Transportation	$1,433,544	$1,595,915	$0	$1,433,544	$1,595,915
Utilities	$234,921	$261,529	$0	$234,921	$261,529
Warehousing	$164,390	$183,009	$0	$164,390	$183,009
Non-Core	$17,129,902	$19,070,125	$0	$17,129,902	$19,070,125
Subtotal	**$29,025,131**	**$32,312,671**	**$0**	**$29,025,131**	**$32,312,671**
Initial Employee Training – Designated Person					
Agriculture, Forestry, and Fishing	$327,830	$364,961	$0	$327,830	$364,961
Building Materials and Equipment Suppliers	$73,822	$82,183	$0	$73,822	$82,183
Commercial Kitchens	$581,739	$647,630	$0	$581,739	$647,630

Table VIII.C.27. Total Costs – Training (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Construction	$1,320,375	$1,469,927	$0	$1,320,375	$1,469,927
Drycleaning and Commercial Laundries	$60,733	$67,612	$0	$60,733	$67,612
Landscaping and Facilities Support	$248,220	$276,335	$0	$248,220	$276,335
Maintenance and Repair	$362,015	$403,019	$0	$362,015	$403,019
Manufacturing	$257,945	$287,161	$0	$257,945	$287,161
Oil and Gas	$133,712	$148,857	$0	$133,712	$148,857
Postal and Delivery Services	$161,211	$179,470	$0	$161,211	$179,470
Recreation and Amusement	$151,524	$168,687	$0	$151,524	$168,687
Sanitation and Waste Removal	$13,619	$15,161	$0	$13,619	$15,161
Telecommunications	$51,763	$57,626	$0	$51,763	$57,626
Temporary Help Services	$28,883	$32,155	$0	$28,883	$32,155
Transportation	$537,579	$598,468	$0	$537,579	$598,468
Utilities	$88,095	$98,074	$0	$88,095	$98,074
Warehousing	$61,646	$68,628	$0	$61,646	$68,628
Non-Core	$6,423,713	$7,151,297	$0	$6,423,713	$7,151,297
Subtotal	**$10,884,424**	**$12,117,251**	**$0**	**$10,884,424**	**$12,117,251**
Initial Employee Training – At-Risk Worker					
Agriculture, Forestry, and Fishing	$934,279	$1,040,101	$0	$934,279	$1,040,101
Building Materials and Equipment Suppliers	$746,591	$831,153	$0	$746,591	$831,153
Commercial Kitchens	$4,066,902	$4,527,541	$0	$4,066,902	$4,527,541
Construction	$4,331,381	$4,821,976	$0	$4,331,381	$4,821,976
Drycleaning and Commercial Laundries	$122,360	$136,219	$0	$122,360	$136,219
Landscaping and Facilities Support	$1,942,964	$2,163,034	$0	$1,942,964	$2,163,034
Maintenance and Repair	$1,029,589	$1,146,206	$0	$1,029,589	$1,146,206

Table VIII.C.27. Total Costs – Training (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Manufacturing	$2,507,091	$2,791,058	$0	$2,507,091	$2,791,058
Oil and Gas	$541,637	$602,986	$0	$541,637	$602,986
Postal and Delivery Services	$361,448	$402,388	$0	$361,448	$402,388
Recreation and Amusement	$724,272	$806,307	$0	$724,272	$806,307
Sanitation and Waste Removal	$142,218	$158,326	$0	$142,218	$158,326
Telecommunications	$420,884	$468,556	$0	$420,884	$468,556
Temporary Help Services	$2,505,173	$2,788,922	$0	$2,505,173	$2,788,922
Transportation	$1,356,516	$1,510,162	$0	$1,356,516	$1,510,162
Utilities	$582,011	$647,932	$0	$582,011	$647,932
Warehousing	$553,790	$616,515	$0	$553,790	$616,515
Non-Core	$53,834,831	$59,932,448	$0	$53,834,831	$59,932,448
Subtotal	**$76,703,936**	**$85,391,828**	**$0**	**$76,703,936**	**$85,391,828**
Initial Supervisor Training Development					
Agriculture, Forestry, and Fishing	$437,106	$486,615	$0	$437,106	$486,615
Building Materials and Equipment Suppliers	$98,429	$109,577	$0	$98,429	$109,577
Commercial Kitchens	$775,652	$863,507	$0	$775,652	$863,507
Construction	$1,760,499	$1,959,903	$0	$1,760,499	$1,959,903
Drycleaning and Commercial Laundries	$80,978	$90,150	$0	$80,978	$90,150
Landscaping and Facilities Support	$330,960	$368,446	$0	$330,960	$368,446
Maintenance and Repair	$482,687	$537,358	$0	$482,687	$537,358
Manufacturing	$343,926	$382,881	$0	$343,926	$382,881
Oil and Gas	$178,283	$198,477	$0	$178,283	$198,477
Postal and Delivery Services	$214,948	$239,294	$0	$214,948	$239,294
Recreation and Amusement	$202,033	$224,916	$0	$202,033	$224,916

Table VIII.C.27. Total Costs – Training (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Sanitation and Waste Removal	$18,158	$20,215	$0	$18,158	$20,215
Telecommunications	$69,017	$76,834	$0	$69,017	$76,834
Temporary Help Services	$38,511	$42,873	$0	$38,511	$42,873
Transportation	$716,772	$797,958	$0	$716,772	$797,958
Utilities	$117,460	$130,765	$0	$117,460	$130,765
Warehousing	$82,195	$91,505	$0	$82,195	$91,505
Non-Core	$8,564,951	$9,535,063	$0	$8,564,951	$9,535,063
Subtotal	**$14,512,566**	**$16,156,335**	**$0**	**$14,512,566**	**$16,156,335**
Initial Supervisor Training – Supervisor					
Agriculture, Forestry, and Fishing	$273,191	$304,135	$0	$273,191	$304,135
Building Materials and Equipment Suppliers	$61,518	$68,486	$0	$61,518	$68,486
Commercial Kitchens	$484,783	$539,692	$0	$484,783	$539,692
Construction	$1,100,312	$1,224,939	$0	$1,100,312	$1,224,939
Drycleaning and Commercial Laundries	$50,611	$56,344	$0	$50,611	$56,344
Landscaping and Facilities Support	$206,850	$230,279	$0	$206,850	$230,279
Maintenance and Repair	$301,679	$335,849	$0	$301,679	$335,849
Manufacturing	$214,954	$239,301	$0	$214,954	$239,301
Oil and Gas	$111,427	$124,048	$0	$111,427	$124,048
Postal and Delivery Services	$134,342	$149,559	$0	$134,342	$149,559
Recreation and Amusement	$126,270	$140,572	$0	$126,270	$140,572
Sanitation and Waste Removal	$11,349	$12,634	$0	$11,349	$12,634
Telecommunications	$43,136	$48,021	$0	$43,136	$48,021
Temporary Help Services	$24,070	$26,796	$0	$24,070	$26,796
Transportation	$447,983	$498,723	$0	$447,983	$498,723

Table VIII.C.27. Total Costs – Training (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Utilities	$73,413	$81,728	$0	$73,413	$81,728
Warehousing	$51,372	$57,190	$0	$51,372	$57,190
Non-Core	$5,353,094	$5,959,414	$0	$5,353,094	$5,959,414
Subtotal	**$9,070,353**	**$10,097,710**	**$0**	**$9,070,353**	**$10,097,710**
Initial Supervisor Training – Designated Person					
Agriculture, Forestry, and Fishing	$218,553	$243,308	$0	$218,553	$243,308
Building Materials and Equipment Suppliers	$49,214	$54,789	$0	$49,214	$54,789
Commercial Kitchens	$387,826	$431,753	$0	$387,826	$431,753
Construction	$880,250	$979,951	$0	$880,250	$979,951
Drycleaning and Commercial Laundries	$40,489	$45,075	$0	$40,489	$45,075
Landscaping and Facilities Support	$165,480	$184,223	$0	$165,480	$184,223
Maintenance and Repair	$241,343	$268,679	$0	$241,343	$268,679
Manufacturing	$171,963	$191,440	$0	$171,963	$191,440
Oil and Gas	$89,142	$99,238	$0	$89,142	$99,238
Postal and Delivery Services	$107,474	$119,647	$0	$107,474	$119,647
Recreation and Amusement	$101,016	$112,458	$0	$101,016	$112,458
Sanitation and Waste Removal	$9,079	$10,107	$0	$9,079	$10,107
Telecommunications	$34,508	$38,417	$0	$34,508	$38,417
Temporary Help Services	$19,256	$21,437	$0	$19,256	$21,437
Transportation	$358,386	$398,979	$0	$358,386	$398,979
Utilities	$58,730	$65,382	$0	$58,730	$65,382
Warehousing	$41,097	$45,752	$0	$41,097	$45,752
Non-Core	$4,282,475	$4,767,531	$0	$4,282,475	$4,767,531
Subtotal	**$7,256,283**	**$8,078,168**	**$0**	**$7,256,283**	**$8,078,168**
Annual Employee Refresher Training – Designated Person					

Table VIII.C.27. Total Costs – Training (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Agriculture, Forestry, and Fishing	$0	$0	$1,768,652	$1,768,652	$1,768,652
Building Materials and Equipment Suppliers	$0	$0	$369,108	$369,108	$369,108
Commercial Kitchens	$0	$0	$2,850,713	$2,850,713	$2,850,713
Construction	$0	$0	$527,929	$527,929	$527,929
Drycleaning and Commercial Laundries	$0	$0	$303,666	$303,666	$303,666
Landscaping and Facilities Support	$0	$0	$1,209,995	$1,209,995	$1,209,995
Maintenance and Repair	$0	$0	$1,810,074	$1,810,074	$1,810,074
Oil and Gas	$0	$0	$672,075	$672,075	$672,075
Postal and Delivery Services	$0	$0	$806,053	$806,053	$806,053
Recreation and Amusement	$0	$0	$757,622	$757,622	$757,622
Sanitation and Waste Removal	$0	$0	$68,093	$68,093	$68,093
Telecommunications	$0	$0	$258,814	$258,814	$258,814
Temporary Help Services	$0	$0	$144,417	$144,417	$144,417
Transportation	$0	$0	$2,950,027	$2,950,027	$2,950,027
Utilities	$0	$0	$618,234	$618,234	$618,234
Warehousing	$0	$0	$308,231	$308,231	$308,231
Non-Core	$0	$0	$32,061,160	$32,061,160	$32,061,160
Subtotal	**$0**	**$0**	**$47,484,865**	**$47,484,865**	**$47,484,865**
Annual Employee Refresher Training – At-Risk Worker					
Agriculture, Forestry, and Fishing	$0	$0	$6,150,895	$6,150,895	$6,150,895
Building Materials and Equipment Suppliers	$0	$0	$3,732,953	$3,732,953	$3,732,953
Commercial Kitchens	$0	$0	$19,973,908	$19,973,908	$19,973,908
Construction	$0	$0	$7,431,366	$7,431,366	$7,431,366

Table VIII.C.27. Total Costs – Training (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Drycleaning and Commercial Laundries	$0	$0	$611,800	$611,800	$611,800
Landscaping and Facilities Support	$0	$0	$9,244,018	$9,244,018	$9,244,018
Maintenance and Repair	$0	$0	$5,147,944	$5,147,944	$5,147,944
Oil and Gas	$0	$0	$2,725,803	$2,725,803	$2,725,803
Postal and Delivery Services	$0	$0	$1,807,242	$1,807,242	$1,807,242
Recreation and Amusement	$0	$0	$3,621,359	$3,621,359	$3,621,359
Sanitation and Waste Removal	$0	$0	$711,089	$711,089	$711,089
Telecommunications	$0	$0	$2,104,420	$2,104,420	$2,104,420
Temporary Help Services	$0	$0	$12,525,865	$12,525,865	$12,525,865
Transportation	$0	$0	$7,140,067	$7,140,067	$7,140,067
Utilities	$0	$0	$4,739,454	$4,739,454	$4,739,454
Warehousing	$0	$0	$2,768,949	$2,768,949	$2,768,949
Non-Core	$0	$0	$268,614,044	$268,614,044	$268,614,044
Subtotal	**$0**	**$0**	**$359,051,175**	**$359,051,175**	**$359,051,175**
Annual Supervisor Refresher Training – Supervisor					
Agriculture, Forestry, and Fishing	$0	$0	$1,473,877	$1,473,877	$1,473,877
Building Materials and Equipment Suppliers	$0	$0	$307,590	$307,590	$307,590
Commercial Kitchens	$0	$0	$2,375,594	$2,375,594	$2,375,594
Construction	$0	$0	$439,941	$439,941	$439,941
Drycleaning and Commercial Laundries	$0	$0	$253,055	$253,055	$253,055
Landscaping and Facilities Support	$0	$0	$1,008,329	$1,008,329	$1,008,329
Maintenance and Repair	$0	$0	$1,508,395	$1,508,395	$1,508,395
Oil and Gas	$0	$0	$560,062	$560,062	$560,062
Postal and Delivery Services	$0	$0	$671,711	$671,711	$671,711

Table VIII.C.27. Total Costs – Training (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Recreation and Amusement	$0	$0	$631,352	$631,352	$631,352
Sanitation and Waste Removal	$0	$0	$56,744	$56,744	$56,744
Telecommunications	$0	$0	$215,678	$215,678	$215,678
Temporary Help Services	$0	$0	$120,348	$120,348	$120,348
Transportation	$0	$0	$2,458,356	$2,458,356	$2,458,356
Utilities	$0	$0	$515,195	$515,195	$515,195
Warehousing	$0	$0	$256,859	$256,859	$256,859
Non-Core	$0	$0	$26,717,633	$26,717,633	$26,717,633
Subtotal	**$0**	**$0**	**$39,570,721**	**$39,570,721**	**$39,570,721**
Annual Supervisor Refresher Training – Designated Person					
Agriculture, Forestry, and Fishing	$0	$0	$1,179,102	$1,179,102	$1,179,102
Building Materials and Equipment Suppliers	$0	$0	$246,072	$246,072	$246,072
Commercial Kitchens	$0	$0	$1,900,475	$1,900,475	$1,900,475
Construction	$0	$0	$351,953	$351,953	$351,953
Drycleaning and Commercial Laundries	$0	$0	$202,444	$202,444	$202,444
Landscaping and Facilities Support	$0	$0	$806,663	$806,663	$806,663
Maintenance and Repair	$0	$0	$1,206,716	$1,206,716	$1,206,716
Oil and Gas	$0	$0	$448,050	$448,050	$448,050
Postal and Delivery Services	$0	$0	$537,369	$537,369	$537,369
Recreation and Amusement	$0	$0	$505,082	$505,082	$505,082
Sanitation and Waste Removal	$0	$0	$45,395	$45,395	$45,395
Telecommunications	$0	$0	$172,542	$172,542	$172,542
Temporary Help Services	$0	$0	$96,278	$96,278	$96,278
Transportation	$0	$0	$1,966,685	$1,966,685	$1,966,685

Table VIII.C.27. Total Costs – Training (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Utilities	$0	$0	$412,156	$412,156	$412,156
Warehousing	$0	$0	$205,487	$205,487	$205,487
Non-Core	$0	$0	$21,374,107	$21,374,107	$21,374,107
Subtotal	**$0**	**$0**	**$31,656,577**	**$31,656,577**	**$31,656,577**
Supplemental Employee Refresher Training – Designated Person					
Agriculture, Forestry, and Fishing	$0	$0	$17,687	$17,687	$17,687
Building Materials and Equipment Suppliers	$0	$0	$3,691	$3,691	$3,691
Commercial Kitchens	$0	$0	$28,507	$28,507	$28,507
Construction	$0	$0	$5,279	$5,279	$5,279
Drycleaning and Commercial Laundries	$0	$0	$3,037	$3,037	$3,037
Landscaping and Facilities Support	$0	$0	$12,100	$12,100	$12,100
Maintenance and Repair	$0	$0	$18,101	$18,101	$18,101
Oil and Gas	$0	$0	$6,721	$6,721	$6,721
Postal and Delivery Services	$0	$0	$8,061	$8,061	$8,061
Recreation and Amusement	$0	$0	$7,576	$7,576	$7,576
Sanitation and Waste Removal	$0	$0	$681	$681	$681
Telecommunications	$0	$0	$2,588	$2,588	$2,588
Temporary Help Services	$0	$0	$1,444	$1,444	$1,444
Transportation	$0	$0	$29,500	$29,500	$29,500
Utilities	$0	$0	$6,182	$6,182	$6,182
Warehousing	$0	$0	$3,082	$3,082	$3,082
Non-Core	$0	$0	$320,612	$320,612	$320,612
Subtotal	**$0**	**$0**	**$474,849**	**$474,849**	**$474,849**
Supplemental Employee Refresher Training – At-Risk Worker					

Table VIII.C.27. Total Costs – Training (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Agriculture, Forestry, and Fishing	$0	$0	$61,509	$61,509	$61,509
Building Materials and Equipment Suppliers	$0	$0	$37,330	$37,330	$37,330
Commercial Kitchens	$0	$0	$199,739	$199,739	$199,739
Construction	$0	$0	$74,314	$74,314	$74,314
Drycleaning and Commercial Laundries	$0	$0	$6,118	$6,118	$6,118
Landscaping and Facilities Support	$0	$0	$92,440	$92,440	$92,440
Maintenance and Repair	$0	$0	$51,479	$51,479	$51,479
Oil and Gas	$0	$0	$27,258	$27,258	$27,258
Postal and Delivery Services	$0	$0	$18,072	$18,072	$18,072
Recreation and Amusement	$0	$0	$36,214	$36,214	$36,214
Sanitation and Waste Removal	$0	$0	$7,111	$7,111	$7,111
Telecommunications	$0	$0	$21,044	$21,044	$21,044
Temporary Help Services	$0	$0	$125,259	$125,259	$125,259
Transportation	$0	$0	$71,401	$71,401	$71,401
Utilities	$0	$0	$47,395	$47,395	$47,395
Warehousing	$0	$0	$27,689	$27,689	$27,689
Non-Core	$0	$0	$2,686,140	$2,686,140	$2,686,140
Subtotal	**$0**	**$0**	**$3,590,512**	**$3,590,512**	**$3,590,512**
Total					
Agriculture, Forestry, and Fishing	$3,065,172	$3,412,350	$10,651,721	$13,716,894	$14,064,071
Building Materials and Equipment Suppliers	$1,226,431	$1,365,343	$4,696,744	$5,923,175	$6,062,087
Commercial Kitchens	$7,848,207	$8,737,136	$27,328,936	$35,177,143	$36,066,072
Construction	$12,913,815	$14,376,502	$8,830,781	$21,744,597	$23,207,283

Table VIII.C.27. Total Costs – Training (2023$)

Industry Category	One-Time Annualized		Annual	Total Annualized	
	0%	2%		0%	2%
Drycleaning and Commercial Laundries	$517,126	$575,699	$1,380,121	$1,897,247	$1,955,819
Landscaping and Facilities Support	$3,556,395	$3,959,211	$12,373,546	$15,929,940	$16,332,756
Maintenance and Repair	$3,382,686	$3,765,827	$9,742,711	$13,125,396	$13,508,537
Manufacturing	$4,183,731	$4,657,602	$0	$4,183,731	$4,657,602
Oil and Gas	$1,410,768	$1,570,559	$4,439,969	$5,850,737	$6,010,528
Postal and Delivery Services	$1,409,318	$1,568,945	$3,848,509	$5,257,827	$5,417,453
Recreation and Amusement	$1,709,181	$1,902,772	$5,559,205	$7,268,385	$7,461,976
Sanitation and Waste Removal	$230,739	$256,874	$889,114	$1,119,853	$1,145,988
Telecommunications	$757,342	$843,122	$2,775,086	$3,532,428	$3,618,208
Temporary Help Services	$2,692,916	$2,997,929	$13,013,611	$15,706,527	$16,011,540
Transportation	$4,850,780	$5,400,205	$14,616,036	$19,466,817	$20,016,242
Utilities	$1,154,630	$1,285,410	$6,338,616	$7,493,247	$7,624,026
Warehousing	$954,490	$1,062,600	$3,570,298	$4,524,787	$4,632,898
Non-Core	$95,588,967	$106,415,877	$351,773,696	$447,362,662	$458,189,573
Total	**$147,452,693**	**$164,153,963**	**$481,828,698**	**$629,281,391**	**$645,982,661**

Source: OSHA.

Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

H. Recordkeeping.

The proposed standard would require affected indoor establishments to maintain environmental measurements for six months. Certain models of environmental monitoring equipment can automatically upload measurements taken to a recordkeeping database. OSHA assumes that establishments required to maintain these records would purchase a wireless temperature and humidity data logger with this capability (cost captured under the Identifying Heat Hazards provision in Section VIII.C.V.C.). For this reason, OSHA assumes that establishments would not incur an additional cost to maintain these records beyond the time required to take the measurements themselves (also captured in Section VIII.C.V.C.).

I. Total Costs of the Proposed Standard.

Accounting for the costs associated with all provisions, OSHA estimates that annualized costs, using a 2 percent discount rate over a ten-year period, would equal $7.8 billion. Table VIII.C.28. shows the total costs of the proposed standard by industry category and region. Table VIII.C.29. shows the total costs of the proposed standard by provision.

Table VIII.C.28. Total Costs of Proposed Standard by Industry Category and Region (2023$)

	One-Time	Periodic Costs Annualized		Annual	Cost Savings	Total Annualized [a]	
		0%	2%			0%	2%
Agriculture, Forestry, and Fishing							
Alaskan	$382,520	$25,400	$23,728	$91,573	$7	$132,358	$136,792
Central	$32,095,286	$1,874,386	$1,751,017	$62,352,975	$28,665,280	$37,084,663	$37,455,687
Eastern	$17,835,946	$955,385	$892,504	$47,389,145	$24,123,746	$25,144,533	$25,350,373
Pacific	$234,288	$13,394	$12,512	$934,183	$384,690	$574,262	$576,969
Southern	$30,484,939	$1,686,951	$1,575,919	$225,927,630	$129,505,465	$99,639,354	$99,991,389
Western	$10,348,543	$953,696	$890,925	$41,033,629	$18,153,681	$24,010,171	$24,131,198
Subtotal	**$91,381,522**	**$5,509,211**	**$5,146,605**	**$377,729,135**	**$200,832,869**	**$186,585,339**	**$187,642,407**
Building Materials and Equipment Suppliers							
Alaskan	$73,244	$6,454	$6,029	$22,293	$11	$30,252	$31,108
Central	$6,164,179	$536,834	$501,500	$20,645,717	$10,913,203	$10,402,615	$10,474,581
Eastern	$8,768,769	$785,209	$733,528	$34,605,315	$19,559,927	$16,000,785	$16,103,245
Pacific	$137,453	$12,450	$11,631	$1,020,163	$507,369	$527,784	$529,391
Southern	$8,097,617	$709,966	$663,237	$126,957,154	$81,071,558	$46,766,355	$46,860,912
Western	$5,225,565	$522,755	$488,349	$15,565,091	$7,398,609	$8,741,314	$8,802,592
Subtotal	**$28,466,828**	**$2,573,667**	**$2,404,273**	**$198,815,733**	**$119,450,676**	**$82,469,106**	**$82,801,829**
Commercial Kitchens							
Alaskan	$549,495	$76,847	$71,789	$165,987	$19	$228,602	$235,133
Central	$49,420,733	$6,134,657	$5,730,885	$102,302,796	$50,480,882	$57,377,453	$57,961,753
Eastern	$81,115,976	$10,278,954	$9,602,411	$205,636,428	$111,478,395	$103,297,526	$104,257,396
Pacific	$1,643,878	$197,251	$184,268	$8,155,868	$3,774,306	$4,565,675	$4,585,083
Southern	$64,789,002	$7,549,866	$7,052,947	$658,904,303	$422,956,059	$243,182,131	$243,946,159
Western	$45,955,018	$6,478,114	$6,051,736	$95,928,702	$43,836,108	$57,335,907	$57,882,325
Subtotal	**$243,474,102**	**$30,715,689**	**$28,694,036**	**$1,071,094,084**	**$632,525,768**	**$465,987,295**	**$468,867,850**
Construction							
Alaskan	$1,970,414	$90,248	$84,308	$381,506	$146	$587,427	$610,106
Central	$124,809,723	$5,773,126	$5,393,149	$276,994,643	$143,672,185	$146,380,743	$147,817,492
Eastern	$185,264,838	$8,472,733	$7,915,072	$563,370,759	$318,816,805	$263,927,711	$266,060,003
Pacific	$2,828,279	$128,458	$120,003	$20,460,443	$10,357,236	$10,398,881	$10,431,429

Disclaimer: This proposed rule has been submitted to the Office of the Federal Register (OFR) for publication, and is currently pending placement on public inspection at the OFR and publication in the Federal Register. This draft version of the proposed rule may vary slightly from the published document if minor technical or formatting changes are made during the OFR review process. Only the version published in the Federal Register is the official proposed rule.

Table VIII.C.28. Total Costs of Proposed Standard by Industry Category and Region (2023$)

	One-Time	Periodic Costs Annualized		Annual	Cost Savings	Total Annualized [a]	
		0%	2%			0%	2%
Southern	$140,183,098	$6,281,225	$5,867,806	$1,990,987,667	$1,252,043,769	$753,590,330	$755,203,238
Western	$95,685,192	$5,693,786	$5,319,031	$252,822,597	$131,327,431	$131,633,064	$132,739,616
Subtotal	**$550,741,543**	**$26,439,574**	**$24,699,368**	**$3,105,017,615**	**$1,856,217,570**	**$1,306,518,156**	**$1,312,861,883**
Drycleaning and Commercial Laundries							
Alaskan	$20,363	$3,291	$3,075	$6,992	$1	$9,356	$9,600
Central	$2,472,950	$410,674	$383,645	$3,748,206	$1,537,412	$2,499,157	$2,528,809
Eastern	$6,132,138	$1,054,962	$985,526	$9,594,795	$4,179,153	$6,134,352	$6,208,027
Pacific	$60,013	$8,303	$7,757	$324,887	$154,506	$177,212	$177,925
Southern	$3,813,305	$622,595	$581,616	$23,397,552	$13,735,831	$10,105,311	$10,150,992
Western	$2,485,111	$447,179	$417,746	$3,716,313	$1,369,087	$2,640,455	$2,670,391
Subtotal	**$14,983,879**	**$2,547,005**	**$2,379,365**	**$40,788,745**	**$20,975,991**	**$21,565,843**	**$21,745,744**
Landscaping and Facilities Support							
Alaskan	$197,905	$9,247	$8,639	$57,613	$43	$78,285	$80,564
Central	$15,928,220	$910,565	$850,633	$52,336,359	$26,156,301	$27,863,936	$28,047,989
Eastern	$26,916,385	$1,487,495	$1,389,590	$122,773,476	$67,859,770	$57,754,094	$58,064,912
Pacific	$437,568	$23,090	$21,570	$4,330,295	$2,117,991	$2,258,370	$2,263,419
Southern	$20,065,797	$1,057,656	$988,043	$363,466,916	$223,153,028	$142,426,233	$142,657,739
Western	$15,235,305	$858,763	$802,240	$48,189,915	$22,716,571	$27,082,750	$27,258,747
Subtotal	**$78,781,181**	**$4,346,816**	**$4,060,716**	**$591,154,573**	**$342,003,705**	**$257,463,668**	**$258,373,369**
Maintenance and Repair							
Alaskan	$215,858	$26,776	$25,014	$67,597	$14	$91,847	$94,399
Central	$21,311,213	$2,695,519	$2,518,105	$37,119,880	$16,211,936	$23,308,617	$23,560,779
Eastern	$29,094,622	$3,559,615	$3,325,327	$64,302,224	$31,787,358	$35,780,290	$36,124,066
Pacific	$351,104	$42,847	$40,027	$1,479,871	$638,831	$880,434	$884,582
Southern	$24,302,282	$2,900,712	$2,709,792	$199,152,349	$119,019,773	$82,852,875	$83,139,736
Western	$16,832,123	$2,263,433	$2,114,457	$30,066,027	$12,222,844	$19,752,738	$19,952,439
Subtotal	**$92,107,202**	**$11,488,901**	**$10,732,722**	**$332,187,947**	**$179,880,757**	**$162,666,801**	**$163,756,002**
Manufacturing							
Alaskan	$208,090	$14,066	$13,141	$32,847	$44	$55,019	$57,432

Table VIII.C.28. Total Costs of Proposed Standard by Industry Category and Region (2023$)

	One-Time	Periodic Costs Annualized		Annual	Cost Savings	Total Annualized [a]	
		0%	2%			0%	2%
Central	$46,722,857	$2,476,921	$2,313,895	$225,799,894	$134,580,429	$96,139,443	$96,678,557
Eastern	$49,352,278	$2,864,175	$2,675,660	$308,082,858	$193,954,812	$119,349,692	$119,920,136
Pacific	$275,775	$22,532	$21,049	$1,788,665	$931,985	$886,512	$889,725
Southern	$38,013,636	$2,135,219	$1,994,682	$830,736,198	$556,561,957	$278,189,127	$278,628,229
Western	$27,269,499	$2,028,785	$1,895,254	$86,192,896	$44,851,904	$44,270,821	$44,587,803
Subtotal	**$161,842,134**	**$9,541,698**	**$8,913,680**	**$1,452,633,359**	**$930,881,129**	**$538,890,613**	**$540,761,882**
Oil and Gas							
Alaskan	$230,784	$11,136	$10,403	$75,868	$53	$100,007	$102,665
Central	$5,254,963	$447,260	$417,823	$8,133,964	$3,324,037	$5,380,150	$5,441,459
Eastern	$2,946,199	$240,700	$224,857	$5,775,743	$2,726,288	$3,368,145	$3,402,478
Southern	$21,685,085	$1,640,611	$1,532,629	$245,969,418	$149,975,760	$98,326,228	$98,578,405
Western	$2,771,305	$239,669	$223,894	$4,717,343	$1,903,145	$3,115,295	$3,147,643
Subtotal	**$32,888,335**	**$2,579,376**	**$2,409,606**	**$264,672,336**	**$157,929,282**	**$110,289,825**	**$110,672,651**
Postal and Delivery Services							
Alaskan	$223,989	$27,487	$25,678	$64,174	$2	$89,319	$91,966
Central	$10,250,664	$1,189,567	$1,111,272	$12,828,157	$4,937,878	$9,034,302	$9,155,164
Eastern	$13,819,885	$1,517,304	$1,417,437	$23,773,311	$11,087,251	$14,219,778	$14,382,377
Pacific	$144,635	$16,201	$15,134	$465,869	$185,834	$296,118	$297,821
Southern	$10,090,918	$1,136,067	$1,061,293	$58,865,833	$34,096,163	$25,892,369	$26,011,207
Western	$5,829,356	$736,437	$687,966	$9,319,823	$3,668,631	$6,307,770	$6,376,742
Subtotal	**$40,359,447**	**$4,623,062**	**$4,318,780**	**$105,317,166**	**$53,975,760**	**$55,839,656**	**$56,315,277**
Recreation and Amusement							
Alaskan	$210,864	$20,358	$19,018	$57,466	$3	$80,585	$83,055
Central	$9,811,950	$843,376	$787,866	$17,877,387	$7,852,494	$11,090,426	$11,204,934
Eastern	$15,803,455	$1,264,869	$1,181,617	$39,502,426	$19,982,691	$21,226,567	$21,410,624
Pacific	$200,532	$15,892	$14,846	$963,577	$406,550	$578,670	$581,005
Southern	$10,826,402	$823,464	$769,265	$122,043,421	$73,576,662	$49,631,746	$49,757,665
Western	$8,194,447	$700,718	$654,598	$18,758,186	$8,218,151	$11,429,552	$11,525,169
Subtotal	**$45,047,650**	**$3,668,678**	**$3,427,212**	**$199,202,463**	**$110,036,551**	**$94,037,545**	**$94,562,450**

Table VIII.C.28. Total Costs of Proposed Standard by Industry Category and Region (2023$)

	One-Time	Periodic Costs Annualized		Annual	Cost Savings	Total Annualized [a]	
		0%	2%			0%	2%
Sanitation and Waste Removal							
Alaskan	$33,469	$2,039	$1,905	$9,981	$7	$13,525	$13,912
Central	$1,117,336	$84,368	$78,815	$3,783,722	$1,935,236	$1,968,656	$1,981,649
Eastern	$1,797,476	$120,671	$112,729	$8,449,281	$4,735,129	$3,905,966	$3,926,808
Pacific	$29,262	$1,783	$1,666	$305,303	$153,166	$155,241	$155,580
Southern	$1,367,533	$87,530	$81,769	$26,837,577	$16,888,684	$10,094,399	$10,110,239
Western	$831,250	$58,708	$54,844	$3,257,159	$1,581,133	$1,765,022	$1,774,672
Subtotal	**$5,176,326**	**$355,099**	**$331,727**	**$42,643,022**	**$25,293,354**	**$17,902,810**	**$17,962,860**
Telecommunications							
Alaskan	$64,849	$5,117	$4,780	$21,032	$14	$28,014	$28,769
Central	$3,579,895	$311,005	$290,535	$12,308,820	$6,509,796	$6,188,114	$6,229,906
Eastern	$5,274,999	$425,661	$397,645	$25,792,488	$14,993,199	$11,369,355	$11,430,805
Pacific	$59,652	$4,637	$4,332	$544,081	$280,645	$269,865	$270,559
Southern	$4,687,346	$373,919	$349,308	$79,412,836	$50,846,902	$29,072,061	$29,126,648
Western	$2,724,734	$260,838	$243,670	$9,652,087	$4,891,989	$5,058,656	$5,090,561
Subtotal	**$16,391,476**	**$1,381,178**	**$1,290,271**	**$127,731,345**	**$77,522,545**	**$51,986,066**	**$52,177,248**
Temporary Help Services							
Alaskan	$16,876	$1,220	$1,139	$4,988	$4	$6,794	$6,990
Central	$9,875,319	$230,862	$215,667	$51,592,972	$28,479,694	$24,123,896	$24,236,673
Eastern	$13,317,760	$325,305	$303,894	$112,624,291	$69,170,634	$44,817,963	$44,970,108
Pacific	$285,783	$3,117	$2,912	$4,508,995	$2,418,741	$2,119,144	$2,122,393
Southern	$20,047,132	$276,225	$258,044	$713,170,489	$471,523,566	$243,679,259	$243,907,428
Western	$10,232,846	$198,451	$185,389	$61,162,815	$32,737,109	$29,468,836	$29,585,532
Subtotal	**$53,775,715**	**$1,035,180**	**$967,046**	**$943,064,551**	**$604,329,748**	**$344,215,893**	**$344,829,125**
Transportation							
Alaskan	$705,899	$65,875	$61,539	$204,688	$41	$281,825	$290,083
Central	$39,276,702	$4,098,420	$3,828,669	$55,353,625	$22,046,506	$37,644,631	$38,105,890
Eastern	$37,285,875	$3,738,797	$3,492,716	$69,982,708	$32,796,689	$41,288,487	$41,725,758
Pacific	$586,991	$46,755	$43,678	$3,804,184	$1,787,980	$2,079,579	$2,086,415

Table VIII.C.28. Total Costs of Proposed Standard by Industry Category and Region (2023$)

	One-Time	Periodic Costs Annualized		Annual	Cost Savings	Total Annualized [a]	
		0%	2%			0%	2%
Southern	$39,677,412	$3,803,184	$3,552,865	$299,605,425	$175,255,496	$128,697,989	$129,162,606
Western	$17,327,009	$2,706,608	$2,528,464	$34,566,152	$15,385,219	$21,184,295	$21,391,375
Subtotal	**$134,859,888**	**$14,459,640**	**$13,507,932**	**$463,516,783**	**$247,271,929**	**$231,176,806**	**$232,762,128**
Utilities							
Alaskan	$148,444	$12,671	$11,837	$56,132	$17	$72,227	$73,959
Central	$7,146,656	$575,888	$537,984	$26,352,196	$13,657,174	$13,467,276	$13,550,526
Eastern	$9,587,651	$712,199	$665,323	$48,962,091	$27,538,893	$22,453,183	$22,564,626
Pacific	$62,534	$6,067	$5,668	$408,852	$201,198	$214,514	$215,247
Southern	$10,044,588	$839,241	$784,004	$157,131,720	$98,366,742	$59,853,362	$59,970,488
Western	$4,579,887	$434,070	$405,500	$16,308,986	$7,985,486	$8,824,896	$8,878,506
Subtotal	**$31,569,760**	**$2,580,136**	**$2,410,316**	**$249,219,978**	**$147,749,511**	**$104,885,457**	**$105,253,352**
Warehousing							
Alaskan	$23,861	$3,648	$3,407	$8,026	$1	$10,776	$11,060
Central	$5,061,913	$533,106	$498,018	$15,543,866	$8,175,173	$7,928,195	$7,987,661
Eastern	$7,009,792	$674,099	$629,731	$29,673,913	$17,101,945	$13,340,358	$13,422,450
Pacific	$61,662	$8,558	$7,994	$251,578	$110,383	$148,218	$148,950
Southern	$6,441,787	$661,753	$618,198	$81,655,479	$52,136,892	$30,228,941	$30,304,551
Western	$4,325,559	$500,559	$467,613	$11,931,088	$5,614,252	$6,799,447	$6,850,443
Subtotal	**$22,924,573**	**$2,381,722**	**$2,224,961**	**$139,063,951**	**$83,138,646**	**$58,455,935**	**$58,725,115**
Non-Core							
Alaskan	$5,182,429	$456,951	$426,875	$1,764,690	$644	$2,327,985	$2,388,511
Central	$391,224,691	$38,434,798	$35,905,088	$868,489,307	$403,322,044	$508,133,212	$512,718,138
Eastern	$667,495,610	$60,452,354	$56,473,487	$2,079,644,665	$1,107,489,644	$1,044,949,817	$1,052,751,986
Pacific	$9,892,196	$891,014	$832,369	$54,062,267	$24,745,067	$30,395,521	$30,511,129
Southern	$450,564,899	$48,351,398	$45,168,995	$3,787,838,223	$2,278,523,483	$1,559,206,369	$1,564,503,073
Western	$371,580,343	$38,699,763	$36,152,613	$906,764,875	$401,438,741	$546,354,145	$550,717,629
Subtotal	**$1,895,940,169**	**$187,286,279**	**$174,959,427**	**$7,698,564,027**	**$4,215,519,623**	**$3,691,367,049**	**$3,713,590,466**
Total							
Alaskan	$10,459,352	$858,832	$802,306	$3,093,451	$1,069	$4,224,201	$4,346,103

Table VIII.C.28. Total Costs of Proposed Standard by Industry Category and Region (2023$)

	One-Time	Periodic Costs Annualized		Annual	Cost Savings	Total Annualized [a]	
		0%	2%			0%	2%
Central	$781,525,250	$67,561,332	$63,114,565	$1,853,564,488	$912,457,660	$1,026,015,486	$1,035,137,646
Eastern	$1,178,819,653	$98,930,485	$92,419,056	$3,799,935,917	$2,079,382,329	$1,848,328,601	$1,862,076,179
Pacific	$17,291,605	$1,442,349	$1,347,416	$103,809,082	$49,156,476	$56,526,001	$56,727,623
Southern	$905,182,777	$80,937,580	$75,610,412	$9,992,060,191	$6,199,237,788	$3,891,434,439	$3,902,010,703
Western	$647,433,093	$63,782,331	$59,584,291	$1,649,953,684	$765,300,091	$955,775,136	$963,363,384
Total	**$3,540,711,730**	**$313,512,910**	**$292,878,045**	**$17,402,416,812**	**$10,005,535,413**	**$7,782,303,863**	**$7,823,661,638**

Source: OSHA estimate.

[a] The total costs with cost savings accounts for the potential labor productivity loss avoided by having more efficient and effective rest breaks required by the proposed standard than are currently taken.

Table VIII.C.29. Total Costs of the Proposed Standard by Provision (2023$)

Provision	One-Time	Periodic Costs Annualized		Annual	Costs Savings	Total Annualized [a]	
		0%	2%			0%	2%
Rule Familiarization	$153,433,817	$0	$0	$0	$0	$15,343,382	$17,081,254
Heat Injury and Illness Prevention Plan	$996,730,462	$0	$0	$173,783,056	$0	$273,456,102	$284,745,597
Identifying Heat Hazards	$71,768,226	$313,512,910	$292,878,045	$367,833,244	$0	$406,361,358	$408,428,047
Requirements at or above the Initial Heat Trigger	$563,572,187	$0	$0	$1,530,484,155	$87,542,404	$1,499,298,970	$1,505,682,286
Requirements at or above the High Heat Trigger	$4,451,329	$0	$0	$14,222,455,144	$9,917,993,009	$4,304,907,268	$4,304,957,686
Heat Illness and Emergency Response and Planning	$276,228,782	$0	$0	$626,032,515	$0	$653,655,393	$656,784,106
Training	$1,474,526,928	$0	$0	$481,828,698	$0	$629,281,391	$645,982,661
Total	**$3,540,711,730**	**$313,512,910**	**$292,878,045**	**$17,402,416,812**	**$10,005,535,413**	**$7,782,303,863**	**$7,823,661,638**

Source: OSHA estimate.

[a] The total costs with cost savings accounts for the potential labor productivity loss avoided by having more effective rest breaks required by the proposed standard than are currently taken.

VI. Sensitivity Analysis.

In this section, OSHA presents the results of five sensitivity analyses where isolated changes were made to the parameter (cost model inputs) assumptions that were used to estimate the total costs of the proposed standard. The methodology and calculations underlying the estimates of the costs are generally linear and additive in nature. Thus, the sensitivity of the results and conclusions of this analysis will generally be proportional to isolated variations of a particular input parameter. For example, if the estimated time that an employee spends in annual training was doubled, the corresponding labor costs would double as well.

OSHA evaluated a series of five such changes in cost input parameters to illustrate how these adjustments would impact the estimated total costs of the proposed standard. The requirements of the proposed standard work collectively to produce the benefit of avoided HRIs and heat-related fatalities. The agency is unable to directly attribute avoided HRIs and heat-related fatalities to any specific provision so is unable to analyze the impact that these isolated changes to parameters might have on benefits.

In the first of five sensitivity tests, OSHA decreased the estimated percentage of buildings with adequate cooling, which is an input into calculating the number of indoor in-scope firms and establishments. For this analysis, OSHA reduced the number of buildings that are cooled under an assumption that all employees work in areas that are adequately cooled only if at least 70 percent of their floorspace cooled (versus the assumption that this condition is met when at least 50 percent of the floorspace is cooled).

OSHA used 60 percent of the percentage of buildings with 51 to 99 percent of floorspace cooled according to CBECS data for 2018 plus the percentage of buildings with 100 percent of floorspace cooled to estimate the percentage of establishments that are adequately cooled under this sensitivity analysis. For example, if the percentage of buildings with 51 to 99 percent of floorspace cooled is 25 percent and the percentage of buildings with 100 percent of floorspace cooled is 50 percent, the estimate used in the primary cost analysis is 75 percent of buildings where all employees work in spaces that are adequately cooled, while the sensitivity analysis assumes that the percentage is 65 percent. Table VIII.C.30. shows that the estimated costs of compliance would increase costs by $585 million annually, or by about 7.5 percent.

In the second sensitivity test, OSHA decreased the estimated non-compliance rates (i.e., assumed higher baseline compliance) for rest breaks at both heat triggers by half. OSHA included this sensitivity test due to uncertainty surrounding the assumptions regarding the current provision of rest breaks by employers for non-heat related reasons (e.g., union contracts, existing state laws) that may result in an underestimate of baseline compliance. As a result of this adjustment, estimated annualized total costs decreased by nearly $2.1 billion annually, or approximately 27.0 percent (see Table VIII.C.30.).

In the third sensitivity test, OSHA assumed that all employers without an existing HIIPP will opt to use the OSHA provided template to develop their HIIPP, rather than a portion of establishments opting to write a HIIPP from scratch. Table VIII.C.30. shows that this assumption would lower the estimate annualized costs by $7.8 million, or about 0.1 percent.

For the fourth sensitivity analysis, OSHA increased the estimated travel time to rest breaks by one minute for employees working indoors and two minutes for employees working outdoors, thus increasing travel time to 3 minutes for indoor employees and 6 minutes for outdoor employees. As shown in Table VIII.C.30., the increase in travel time to rest breaks would increase estimated annualized costs by approximately $1.4 billion, or by about 18.1 percent.

The final sensitivity test looks at the percent of productivity recovered as a result of rest breaks. OSHA has incorporated the potential cost reduction from decreased worker pacing—offsetting about 70 percent of the labor cost of rest breaks.[83] However, this analysis rests on specific assumptions and is dependent on the extent of the available literature, in which heat and productivity were assessed in different settings with different break policies, but break policies did not vary within the same setting. An alternative calculation, provided in Appendix A, suggests that this offset may be even greater—up to 100 percent of the time spent for rest breaks being recovered through improved labor productivity.[84] Assuming that scheduled rest breaks offset pacing 100 percent for workers above the high heat trigger, the cost of this proposed standard would decrease by about $2.5 billion making the total costs around $7.8 – $2.5 = $5.3 billion.

OSHA welcomes input from the public regarding all aspects of this sensitivity analysis, including any data or information regarding the accuracy of the preliminary

[83] See Section VIII.C.VI,. Sensitivity Analysis for a discussion of potential underestimation of levels of current compliance with the rest break requirements of the proposed standard and the impacts alternative noncompliance rates might have on the estimated costs of the proposed standard.
[84] As described in the discussion of additional unquantified potential benefits, a reduction of pacing from increased rest breaks could potentially increase production and revenue.

estimates of compliance costs and benefits and how the estimates of costs may be affected by varying assumptions and methodological approaches.

Table VIII.C.30. Results from Sensitivity Analyses of Isolated Changes to Cost Model Parameters

Impact variable	OSHA's Primary Estimate	Sensitivity Test Assumption	Impact to Annualized Costs	Percentage Impact to Costs	Adjusted Annualized Costs
Percentage of buildings cooled by industry	Using CBECS data, considered all buildings with at least 51 percent of floorspace cooled as adequately cooled.	Using CBECS data, considered buildings with 70 percent of floorspace cooled as adequately cooled.	$585,344,087	7.48%	$8,409,005,725
Rest break non-compliance rates	As detailed in Table VIII.C.3. Rest Break Non-Compliance Rates by State and Territory.	Reduce the rates in Table VIII.C.3. Rest Break Non-Compliance Rates by State and Territory by 50 percent (i.e., assume higher baseline compliance).	-$2,113,058,097	-27.01%	$5,710,603,541
Percentage of establishments without existing HIIPP that will use OSHA template	90 percent of all employers with more than 10 employees, all employers with 10 or less employees.	100% of all employers	-$7,832,568	-0.10%	$7,815,829,070
Travel time to/from rest break area	2 minutes for indoor and 4 minutes for outdoor	3 minutes for indoor and 6 minutes for outdoor	$1,418,460,548	18.13%	$9,242,122,186
Recovered break time through improved productivity	~70% of break time offset by increased productivity	100% of break time offset by increased productivity	$2,500,000,000		$5,300,000,000

Source: OSHA estimate.

D. Economic Feasibility.

I. Introduction.

As explained in Section II., Pertinent Legal Authority, to demonstrate that a standard is economically feasible, "OSHA must construct a reasonable estimate of compliance costs and demonstrate a reasonable likelihood that these costs will not threaten the existence or competitive structure of an industry, even if it does portend disaster for some marginal firms." *Lead I*, 647 F.2d at 1272. OSHA standards therefore satisfy the economic feasibility criterion so long as they do not cause massive economic dislocations within a particular industry or imperil the very existence of the industry. *Lead II*, 939 F.2d at 980; see also *Asbestos I*, 499 F.2d. at 478.

In this feasibility analysis, when OSHA speaks of the costs of complying with the proposed standard as a percent of revenues, it is referring to the costs of complying with 29 CFR 1910.148 for the subset of those establishments that will incur obligations under the proposed standard, as opposed to the costs as a percent of *all* establishments in an industry, whether they are directly affected or not. This avoids underestimating the average per-establishment cost used in the feasibility analysis, even while it may overstate the impact on the industry as a whole. Based on the analysis below, OSHA preliminarily concludes that the proposed standard is economically feasible.

II. OSHA's Screening Test for Economic Feasibility.

To determine whether a standard is economically feasible, OSHA typically begins by using a screening test to determine whether the costs of the standard are beneath the threshold level at which the economic viability of an affected industry might be threatened. The screening test is a revenue test. While there is no firm rule on which to base the threshold, OSHA generally considers a standard to be economically feasible for an affected industry when the annualized costs of compliance are less than one percent of annual revenues for the average establishment in an industry that incurs an obligation. The one-percent revenue threshold is intentionally set at a low level so that OSHA can confidently assert that the standard is economically feasible for industries that are below the threshold (i.e., industries for which the costs of compliance are less than one percent of annual revenues). To put the one percent threshold into perspective, across the wide swath of affected industries, prices (and therefore revenues), particularly in the recent past, are generally observed to change by considerably more than one percent per year.[85, 86]

Another and less reliable screening test that OSHA traditionally used to consider whether a standard is economically feasible for an affected industry is whether the costs of compliance are less than ten percent of annual profits for the average establishment (see, e.g., OSHA's economic analysis of its 2016 *Occupational Exposure to Respirable Crystalline Silica* (Silica) rulemaking, 81 FR 16286, 16533 (Mar. 25, 2016); upheld in *N. Am.'s Bldg. Trades Unions v. OSHA*, 878 F.3d 271, 300 (D.C. Cir., 2017)). The ten-percent profit test was intended to be at a sufficiently low level to allow OSHA to identify industries that might require further examination. Specifically, the profit

[85] For data on Consumer Price Index (CPI) changes over time, see BLS's CPI website at *https://www.bls.gov/cpi/*.
[86] For data on Producer Price Index (PPI) changes over time, see BLS's PPI website at *https://www.bls.gov/ppi/*.

screening was primarily used to alert OSHA to potential impacts on industries where demand does not allow for ready absorption of new costs (e.g., industries with foreign competition where the American firms would incur costs that their foreign competitors would not because they are not subject to OSHA requirements). In addition, setting the threshold for the profit test low provided an additional basis for concluding that the standard would be economically feasible for industries below that threshold, without further evaluation. OSHA notes that this profit screen relied on accounting profit (revenues minus explicit costs) versus the superior profit measurement of economic profit (revenues minus explicit costs minus implicit costs).

For this proposed standard, OSHA has discontinued the use of its profit screening test for the following reasons. First, OSHA has been virtually alone among federal agencies in consistently using a profitability test (comparing costs to profits) as part of its regulatory impact analyses. The agency could find no evidence that other federal regulatory agencies are being asked to examine feasibility based on profits. OSHA infers that the silence on the use of the profitability test among all other federal regulatory bodies implies that the revenue test is sufficient. Even OSHA's sister agency, the Mine Safety and Health Administration (MSHA), does not rely on a profitability test despite very similar statutory language that also requires an economic feasibility determination for its regulations.[87]

[87] The Mine Act instructs the Secretary to "set standards which most adequately assure on the basis of the best available evidence that no miner will suffer material impairment of health or functional capacity." 30 U.S.C. 811(a)(6)(A). It goes on to say that "[i]n addition to the attainment of the highest degree of health and safety protection for the miner, other considerations shall be . . . the feasibility of the standards."

Secondly, eliminating the profit test avoids OSHA's reliance on published IRS corporate net income data that lack transparency, comprehensive coverage within industries, and statistical reliability for industries where sample sizes may be statistically inadequate. Furthermore, because firms typically have an incentive to minimize their tax burden, it is reasonable to expect that some of the reported accounting data may have been strategically adjusted to reduce reported profits and their associated tax implications. Business profits are much more likely to reflect such strategic accounting than business revenues. It is therefore unsurprising that OSHA is the lone outlier by including profit screens in its economic analysis. As the Environmental Protection Agency (EPA) noted in its economic impact analysis supporting the *National Air Emission Standards for Hazardous Air Pollutants: Halogenated Solvent Cleaning* (72 FR 25138 (May 3, 2007))[88], when explaining its reliance on a "sales test" (revenue) and rejecting the use of industry profits as part of its determination of the impact of its regulation on small businesses, "revenues or sales data is commonly available data for entities normally impacted by EPA regulations and profits data normally made available is often not the true profits earned by firms due to accounting and tax considerations." EPA also noted that "firms and entities often have ways available in the tax code to reduce their reported profits; thus, using reported profits may lead to an overestimate of the economic impact of a regulation to an affected firm

[88] Available at *https://www.epa.gov/sites/default/files/2020-07/documents/halogenated-solvent_eia_neshap_final_05-2007.pdf*

or entity and their consumers." OSHA is aware of no other publicly available source of business income data.

Even to the extent that firms are not manipulating profit data for tax purposes, profit data are often not accurately aligned with a firm's financial status for purposes of evaluating the economic impact of an OSHA standard. For example, a firm that had already invested a significant amount of capital to voluntarily adopt all of the controls proposed by OSHA's standard could show only marginal profit after accounting for those expenses, suggesting that it would be economically infeasible for that firm to comply with OSHA's standard. Yet, in reality, its ability to comply with OSHA's standard could not be questioned because compliance had already been accomplished.

OSHA is required to make its determinations on the best available evidence, and OSHA's experience has been that the profit screen has amounted to little more than a distraction that unhelpfully flags industries for time-consuming analyses, while not actually aiding the agency in identifying industries for which standards would be economically infeasible. For example, the profit screen can produce the unhelpful result of flagging industries with significant numbers of nonprofit or not-for-profit organizations, as well as failing (at least for tax purposes) enterprises reporting negative profits. The revenue screen is obviously more useful for evaluating the economic impact of the standard on such entities.

Another example of the inefficiency of the profit screen is that it often requires OSHA to manipulate data to adjust for the underlying limitations of the profit data sources to perform the screening analysis at all. If significant adjustments are necessary, the result becomes less meaningful. As a case in point, this proposed standard would affect nineteen 4-digit NAICS industries in the Agriculture, Forestry, Fishing and Hunting sector (NAICS 11). No profit data are available at the 4-digit level for any of the 19 industries, and, since 2013, about half of the profit data at the 3-digit level are missing. OSHA's traditional process for adjusting data to perform the profit screen is to substitute data from the next highest level of NAICS codes (focusing on a broader swath of industries). In order for OSHA to include these industries in a profit screen for this rulemaking, OSHA would have had to apply the 2-digit profit rate to all 19 industries, which are as different as logging and aquaculture with the result potentially flagging economic distress for one industry that is actually the result of more drastic economic problems in an entirely different industry (e.g., flagging impacts on aquaculture that would actually result from a decrease in logging profits).

OSHA also notes that it gathers additional information about potential economic impacts directly from small not-for-profit entities and small businesses as part of its compliance with the Small Business Regulatory Enforcement Fairness Act (SBREFA), discussed in more detail later in this analysis. OSHA is one of only a handful of agencies required to engage in this process, which along with the opportunity for public comment on proposed standards and the accompanying economic analysis, provides an additional avenue for the agency to identify potential significant economic impact not flagged via the revenue screen. Avoiding the red herrings produced by the profit screen allows the agency to focus its resources on areas where the best evidence indicates that a standard may truly pose economic feasibility issues for an industry.

Third, compounding underlying issues with profit reporting is the reality that current IRS data are measurably different and inferior to pre-2013 IRS profit data because the more recent data are presented at a more aggregated level (e.g., at the 2-digit rather than 6-digit NAICS level). These changes to the IRS data make them incompatible with performing this type of screening analysis. Up to this point, where OSHA presented a profit screening analysis, the agency was relying on data from 2003 through 2013. At this point, it is difficult to assume that profit data from those years are meaningfully representative of current industry activity. Accordingly, revenues are a more accurate measure than profits for evaluating economic feasibility and those data are regularly collected and reported by agencies such as the Census Bureau. Therefore, the appropriate economic feasibility test will be the revenue test for most or all covered industries.

OSHA judges that the revenue test can stand alone in playing the signaling role that it has long served in tandem with the profit screen, given the latter's increasing unreliability. That is, a standard is not necessarily judged economically infeasible for the industries that do not pass the initial revenue screening test (i.e., those for which the costs of compliance with the standard are one percent or more of annual revenues) nor did previous OSHA analyses declare a standard infeasible based on one or more industries failing the profit screening test. Instead, OSHA normally views industries failing one or both tests as requiring additional examination as to whether the standard would be economically feasible (see *N. Am.'s Bldg. Trades Unions v. OSHA*, 878 F.3d at 297). OSHA therefore conducts further analysis of the industries that "fail" the screening tests to evaluate whether the standard would threaten the existence or competitive structure of those industries (see *United Steelworkers of Am., AFL-CIO-CLC v. Marshall*, 647 F.2d 1189, 1272 (D.C. Cir. 1980)) and the agency will continue to do so for industries that fail the revenue screening test. There are fluctuations of prices over time with a general inflationary long-term trend upward, and they include effects such as the pass-through of costs and modifications in tax accounting procedures. Using the cost-to-profit test has never led to the conclusion that a standard will eliminate an industry or significantly alter its competitive structure, and as described above, that test is increasingly limited given the lack of data available. Instead, the revenue test is sufficient to signal to OSHA where it should look more carefully at one or more industries to assess feasibility.

III. Time Parameters for Analysis.

OSHA's economic analyses almost always measure the costs of a standard on an annual basis, conducting the screening tests by measuring the cost of the standard against the annual revenues for a given industry. One year is typically the minimum period for evaluating the status of a business; for example, most business filings for tax or financial purposes are annual in nature.

Some compliance costs are up-front costs and others are spread over the duration of compliance with the standard; regardless, the costs of the standard overall will not typically be incurred or absorbed by businesses all at once. For example, the initial capital costs for equipment that will be used over many years are typically addressed through installments over a year or more to leverage loans or payment options to allow more time to marshal revenue and minimize impacts on reserves.

This proposed standard would include permanent requirements to protect employees from hazards of heat stress in the workplace. Thus, for this proposed standard, OSHA has based its analysis of economic feasibility on annual costs and revenues. As noted earlier in this feasibility analysis, this is consistent with OSHA's typical methodology for analyzing economic feasibility (e.g., OSHA's final Silica rule, 81 FR 16533).

IV. Data Used for the Feasibility Screening Test.

OSHA presents the estimated costs of complying with this proposed standard in *Costs of Compliance* (Section VIII.C. of this preamble) and Table VIII.D.1. in this section presents a summary of those costs, including average cost per establishment and total annual costs, by 4-digit NAICS code. OSHA relies on these estimated costs in its examination of feasibility, using the test described above.

Most revenue numbers used to determine cost-to-revenue ratios were obtained from the 2017 SUSB (Census Bureau, 2021a). This is the most current information available from this source, which OSHA considers to be the best available source of revenue data for U.S. businesses. OSHA adjusted these figures to 2023 dollars using the Bureau of Economic Analysis's GDP deflator (BEA, n.d.), which is OSHA's standard source for inflation and deflation analysis (See Section VIII.C., Costs of Compliance for a full discussion of data sources and methodology). For industries that are unavailable in the SUSB dataset, OSHA sourced revenue data from a variety of other sources. These industries are listed below, along with the alternative sources and methods for estimating annual revenues.

Agriculture: As most agricultural industries are not included in the SUSB dataset,[89] OSHA used the Department of Agriculture's 2017 Census of Agriculture (USDA, 2017) to derive estimates of annual revenues. Specifically, OSHA used industry-level estimates of "total sales" from Chapter 1, Table 75 "Summary by North American Industry Classification System" to represent annual revenues. Since these "total sales" data are combined for Aquaculture (NAICS 1125) and Other Animal Production (NAICS 1129), OSHA based NAICS 1125 revenues on NOAA Fisheries' Aquaculture website, which estimated U.S. aquaculture production at $1.5 billion (NOAA, 2023a). For NAICS 1129, OSHA subtracted this $1.5 billion from the Agriculture Census "total sales" estimate for NAICS 1125 and 1129. OSHA adjusted these figures to 2023 dollars using the BEA's GDP deflator.

Local Government: OSHA relied on data from three alternative sources for local government estimates. To estimate total receipts for local government entities, OSHA first estimated the average annual receipts per resident by state. The estimate was equal to the ratio of total local government receipts in the datasets found in the Census Bureau's 2021 Annual Survey of State and Local Government Finances (Census Bureau, 2023a) to the total population served in the GUS dataset. OSHA then multiplied the population

[89] The NAICS industries that were estimated using this method are Oilseed and Grain Farming (111100), Vegetable and Melon Farming (111200), Fruit and Nut Tree Farming (111300), Greenhouse, Nursery, and Floriculture (111400), Other Crop Farming (111900), Cattle Ranch and Farming (112100), Hog and Pig Farming (112200), Poultry and Egg Production (112300), Sheep and Goat Farming (112400), Aquaculture (112500), and Other Animal Production (112900).

associated with each government entity captured in the GUS with the ratio from step one to arrive at an estimate of total annual receipts per government entity.

State Government: OSHA used the state government revenues estimated in the Census Bureau's 2021 Annual Survey of State and Local Government Finances (Census Bureau, 2023a) to estimate annual receipts for state governments. For U.S. territories, OSHA used point estimates from other sources (American Samoa Department of Commerce, 2021; Guam Governor's Office, 2024; CNMI Department of Commerce, 2017; Financial Oversight and Management Board for Puerto Rico, 2023; USVI's Governor's Office, 2024). OSHA adjusted these figures to 2023 dollars using the BEA's GDP deflator.

Rail Transportation,[90] *Postal Service, and Insurance and Employee Benefit Funds:* A small subset of non-agricultural industries are also unavailable in the SUSB dataset. These industries are Rail Transportation (NAICS 4821), Postal and Delivery Services (NAICS 4911), and Insurance and Employment Benefit Funds (NAICS 5251). The economic data estimates for these three industries were derived from the Quarterly Census of Employment and Wages (QCEW) collected by the Bureau of Labor Statistics (BLS). While the QCEW does not present revenue data, it does include total annual wages by industry and state. OSHA used the ratio of receipts to wages from the SUSB

[90] The FRA has promulgated regulations requiring the use of environmental controls to address heat hazards in three specific, limited contexts: non-steam-powered locomotives purchased or remanufactured after June 8, 2012 (49 CFR 229.119(g)), camp cars (49 CFR 228.313(c)), and certain on-track roadway maintenance machines (49 CFR 214.505(a)). OSHA's standard would apply to the working conditions of railroad employees in all other contexts, including within trains and machinery not covered by these regulations and during all outdoor work.

dataset for corresponding sector-level data (e.g., the ratio applied to wage data for NAICS 5251 is based on receipts and wage data for sector 52 in the SUSB dataset) to convert the 2022 QCEW wage data (BLS, 2023f) into annual receipts by industry and state.

A large percentage of the costs of this proposed standard are variable costs because they depend primarily on the number and types of employees at an establishment. While fixed cost can be more limiting in terms of options for businesses, most of the costs of this standard are not fixed. Instead, most of the compliance costs vary with the level and type of output and employment at an establishment.

In general, "[w]hen an industry is subjected to a higher cost, it does not simply swallow it; it raises its price and reduces its output, and in this way shifts a part of the cost to its consumers and a part to its suppliers." *Am. Dental Ass'n v. Sec'y of Labor*, 984 F.2d 823, 829 (7th Cir., 1993). Increases in prices in industries with elastic demand typically result in reduced quantity demanded, but rarely eliminate all demand for the product. Increases in costs can also be passed along, but with a likely reduction in output.

A reduction in output could happen in a variety of ways: individual establishments could reduce their level of service or production, both of which take the form of a reduction of employee hours; some marginal establishments could close; or in the case of an industry with high turnover of establishments, new entry could be delayed until demand equals supply. In many cases, a decrease in overall output for an industry will be a combination of all three kinds of reductions. The primary means of achieving the reduction in output most likely depends on the rate of turnover of establishments in the industry and on the form that the costs of the regulation take.

There are two situations typically mentioned when an industry subject to regulatory costs might be unable to pass those costs on: (1) foreign competition not subject to the regulation; or (2) domestic competition from other firms or other industries, not subject to the regulation, that produce goods or services that are close substitutes. Otherwise, when all affected domestic industries are covered by a standard and foreign businesses must also comply with the standard or are unable to compete effectively, the ability of a competing industry to offer a substitute product at a lower price is greatly diminished.

V. Factors that Indicate the Ability to Absorb or Pass on the Costs of the Proposed Standard.

As discussed above, when all establishments in an affected industry are covered by and required to comply with a standard, none of the competitors gain any economic advantage from the standard and the ability of a competitor to offer a substitute product or service at a lower price is greatly diminished. OSHA believes this is the case for the industries covered by the proposed standard. The scope of proposed 29 CFR 1910.148 is broad. The proposed standard applies, with certain exceptions, to each setting where any employee is exposed to heat above a specified threshold, with the result that if an employer enters such a setting, it must comply with the standard. Hence, given the proposed standard's broad applicability, any employer in a particular industry, including domestic competitors providing similar services or goods, would equally be subject to the proposed standard. This negates the potential for substitution by an industry not subject to the standard.

In addition, and as discussed below, OSHA has concluded that many employers that provide services affected by the proposed standard are generally not subject to international competition (e.g., personal services, such as child care, healthcare services and healthcare support services, and building support services like landscaping and maintenance) because they must be performed domestically. Thus, for those industries, competition from foreign entities that would not also be subject to this proposed standard and its related costs is not a factor.

Finally, while OSHA has attempted to quantify the more obvious cost savings associated with compliance with the proposed standard, in terms of a wage cost offset from increased labor productivity, there are more subtle benefits to reducing heat stress, which suggests that the actual net costs of the proposed standard will be lower than the cost estimates in Section VIII.C., Costs of Compliance used to demonstrate economic feasibility. These cost savings are difficult to quantify and include increased labor supply and decreased disutility to employees. For additional discussion of this issue, see Section VIII.D., Benefits. The economic advantages of increasing the retention of employees by reducing peak heat stressors has been noted in numerous articles, and while difficult to quantify, would tend to counteract the relatively more obvious costs of intervention (e.g., Glaser et al., 2022).

VI. Economic Feasibility Screening Analysis.

This section summarizes OSHA's economic feasibility findings for specific industries covered by the proposed standard. As stated previously, the agency has historically used the two screening tests (costs less than one percent of revenue and costs less than ten percent of profit) as an initial indicator of economic feasibility; however, as discussed earlier, OSHA has discontinued use of the profit screening test because of its serious flaws. In this section, OSHA identifies and discusses the industries that fall above the threshold level for the revenue screening test. OSHA also identifies and discusses industries where small and very small industries fall above the threshold.

A. Economic Feasibility Screening Analysis: All Establishments.

Table VIII.D.1. shows that for the majority of industries, as defined by covered NAICS codes, the cost-to-revenue ratios are below OSHA's screening threshold of one percent, with an average cost for all 298 affected industries of 0.04 percent of revenues. This means that if the average firm needed to absorb the costs of the standard (rather than passing the costs through to other parties), this would amount to an additional four cent burden on $100 of revenue and suggests that compliance with this proposed standard would be feasible for all of these industries.

Five of the 298 industries are estimated to have costs equal to or greater than one percent of revenues. They are all in either agriculture or in-person health care or social assistance services. Two agricultural industries, Sheep and Goat Farming (NAICS 1124) and Other Animal Production (NAICS 1129) were found to have costs above one percent of revenues among affected establishments. Three health care and social assistance industries, Individual and Family Services (NAICS 6241), Vocational Rehabilitation Services (NAICS 6243), and Child Care Services (NAICS 6244) were also found to have costs above one percent of revenues.

Some industries, such as agriculture, would be expected to have relatively large impacts under the proposed standard, due to the prevalence of outdoor work. Nonetheless, the costs of their compliance with the proposed standard would not generally be expected to exceed one percent of revenues when all cost offsets (e.g., current practices to address heat hazards, productivity gains outside of rest breaks) are considered, based on available empirical evidence. For example, the Fair Food Program in Florida (Rivero and Uzcategui, 2024), which encompassed a number of labor benefits (e.g., wage bonuses) in addition to heat stress protection, resulted in price increases of only one extra cent per pound of tomatoes[91], for a total average price of about $2 per pound,[92] to cover the cost of the protections and benefits to employees. This suggests that the net cost of robust heat illness protections may be less than 0.5 percent of revenues in an industry and geographic region that would be most significantly affected by the proposed standard. Sheep and Goat Farming (NAICS 1124) and Other Animal Production (NAICS 1129), which both have costs greater than one percent of revenues, are both heavily weighted to very small family-owned farms (USDA, 2019). Due to a Congressional budget rider, OSHA is not able to expend funds on enforcement activities

[91] This measure is an increase in price, not costs. The pass through of costs could be less than 100 percent due to competition. However, since a portion of the one-cent premium is used to pay a worker bonus, one can infer that the increase in cost of compliance is likely less than one-cent and that pass-through of costs to firms is greater than 100 percent.
[92] As of December 2023, *https://fred.stlouisfed.org/series/APU0000712311*).

for small farms. Only about 5 percent of sheep and goat farms are something other than family-owned farms (i.e., partnerships or corporations). The data for other animal production and aquaculture farms are combined and reported as a single industry. For those two industries combined, 10 percent of farms are something other than family-owned farms. Given the economies of scale necessary for aquaculture, it's likely that these account for more of the corporate farms in the combined Other Animal Production and Aquaculture data, meaning more farms in NAICS 1129 may be family-owned farms than appear to be in the combined data. Based on the 2017 Census of Agriculture (USDA, 2019), about 12,000 of about 93,000 total sheep and goat farms have hired labor and those have on average 2 hired laborers. For other animal production and aquaculture combined, about 41,000 farms out of about 222,000 total farms report having hired labor and have on average 3 hired laborers. Based on the size and organization of these farms, and because a longstanding appropriations rider generally prevents OSHA from enforcing its standards against most small farm operations with 10 or fewer employees, it is unlikely OSHA would enforce the proposed standard in those industries.

Aside from the issues discussed previously, the agency believes some of these industries are unlikely to have as large of a cost as a percentage of revenue as presented, in part due to inflexibility in the cost analysis regarding the amount of time spent outside in heat in a nondiscretionary manner. For example, even if the assumption that employees in healthcare or child care services spend a large percentage of their time outside is realistic under normal circumstances, these employees would likely limit their time outside in high heat situations if only to protect those in their care. This is also true in livestock industries that have existing recommendations for shade and shelter for livestock under extreme heat conditions.[93] If the costs of complying with this proposed standard were onerous, limiting employee exposure to the outdoors during times of extreme heat would be a costless method to comply with the standard and could possibly result in these employers being fully exempt from the standard (e.g., if the employer limited employee's outdoor exposure to meet the exemption for short duration employee exposure). OSHA believes that these five industries have estimated costs that exceed one percent of revenue as a result of data limitations, rather than a real finding of infeasibility. Therefore, OSHA has preliminarily determined that the rule is economically feasible.

The agency welcomes public comment on what the likely practical effects of the proposed standard would be in these various industries. To the extent commenters believe the proposed standard poses an issue of economic feasibility, the agency welcomes comment on how the proposed standard should be modified to achieve greater feasibility.

[93] USDA guidance for the livestock industry identifies provision of shelter, increased shade, and altering plans based on heat exposure (https://www.climatehubs.usda.gov/approach/manage-livestock-cope-warmer-and-drier-conditions). Similarly, South Dakota State University Extension recommends provision of shade during the day, minimization, or avoidance of unnecessary animal work during hot time periods, and adequate ventilation and air movement for indoor animal housing (https://extension.sdstate.edu/heat-stress-small-ruminants).

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
1111	Oilseed and Grain Farming	19,259	$22,566,188	$1,172	$1,039,788	0.11%
1112	Vegetable and Melon Farming	2,635	$13,812,142	$5,242	$1,435,990	0.37%
1113	Fruit and Tree Nut Farming	7,247	$20,428,950	$2,819	$887,377	0.32%
1114	Greenhouse, Nursery, and Floriculture Production	3,362	$17,437,825	$5,186	$922,741	0.56%
1119	Other Crop Farming	12,848	$22,027,652	$1,714	$334,120	0.51%
1121	Cattle Ranching and Farming	24,349	$41,972,826	$1,724	$884,209	0.19%
1122	Hog and Pig Farming	1,491	$3,582,128	$2,402	$3,692,579	0.07%
1123	Poultry and Egg Production	2,904	$6,619,341	$2,279	$3,595,687	0.06%
1124	Sheep and Goat Farming	1,995	$3,420,215	$1,714	$109,499	1.57%
1125	Aquaculture	208	$895,579	$4,301	$1,415,210	0.30%
1129	Other Animal Production	6,404	$11,346,005	$1,772	$143,632	1.23%
1131	Timber Tract Operations	498	$726,511	$1,459	$2,701,023	0.05%
1132	Forest Nurseries and Gathering of Forest Products	168	$179,247	$1,067	$1,164,036	0.09%
1133	Logging	8,084	$7,860,331	$972	$1,692,869	0.06%
1141	Fishing	2,473	$1,185,393	$479	$1,188,497	0.04%
1142	Hunting and Trapping	351	$374,292	$1,066	$799,221	0.13%
1151	Support Activities for Crop Production	5,049	$7,698,282	$1,525	$3,457,291	0.04%
1152	Support Activities for Animal Production	4,765	$3,734,295	$784	$724,524	0.11%
1153	Support Activities for Forestry	1,788	$1,775,204	$993	$1,311,774	0.08%
2111	Oil and Gas Extraction	6,382	$23,921,221	$3,748	$43,886,186	0.01%
2131	Support Activities for Mining	13,313	$79,841,646	$5,997	$7,972,536	0.08%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
2211	Electric Power Generation, Transmission and Distribution	11,101	$80,690,106	$7,269	$45,828,657	0.02%
2212	Natural Gas Distribution	2,497	$12,578,004	$5,037	$40,786,387	0.01%
2213	Water, Sewage and Other Systems	4,879	$11,985,242	$2,456	$3,542,449	0.07%
2361	Residential Building Construction	173,182	$124,444,236	$719	$2,401,784	0.03%
2362	Nonresidential Building Construction	43,061	$97,309,378	$2,260	$13,006,470	0.02%
2371	Utility System Construction	19,159	$112,079,119	$5,850	$9,895,873	0.06%
2372	Land Subdivision	4,943	$3,549,637	$718	$2,247,710	0.03%
2373	Highway, Street, and Bridge Construction	9,752	$43,581,038	$4,469	$15,724,180	0.03%
2379	Other Heavy and Civil Engineering Construction	4,324	$11,738,493	$2,715	$6,787,322	0.04%
2381	Foundation, Structure, and Building Exterior Contractors	93,258	$168,622,817	$1,808	$2,354,331	0.08%
2382	Building Equipment Contractors	184,768	$342,792,872	$1,855	$2,724,810	0.07%
2383	Building Finishing Contractors	116,519	$136,463,298	$1,171	$1,425,684	0.08%
2389	Other Specialty Trade Contractors	69,751	$97,414,741	$1,397	$2,689,361	0.05%
3111	Animal Food Manufacturing	895	$2,550,666	$2,850	$35,255,690	0.01%
3112	Grain and Oilseed Milling	369	$2,281,901	$6,192	$106,536,918	0.01%
3113	Sugar and Confectionery Product Manufacturing	941	$3,360,910	$3,574	$17,901,036	0.02%
3114	Fruit and Vegetable Preserving and Specialty Food Manufacturing	916	$6,966,483	$7,605	$43,442,236	0.02%
3115	Dairy Product Manufacturing	801	$5,315,596	$6,640	$76,548,651	0.01%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
3116	Animal Slaughtering and Processing	1,742	$28,278,302	$16,233	$72,789,500	0.02%
3117	Seafood Product Preparation and Packaging	270	$1,229,069	$4,561	$29,356,549	0.02%
3118	Bakeries and Tortilla Manufacturing	5,847	$16,243,920	$2,778	$6,816,984	0.04%
3119	Other Food Manufacturing	1,887	$9,779,813	$5,183	$33,613,908	0.02%
3121	Beverage Manufacturing	4,528	$9,124,037	$2,015	$14,142,707	0.01%
3122	Tobacco Manufacturing	69	$773,005	$11,285	$262,563,987	0.00%
3131	Fiber, Yarn, and Thread Mills	136	$2,067,055	$15,199	$31,396,792	0.05%
3132	Fabric Mills	386	$2,777,269	$7,204	$18,720,390	0.04%
3133	Textile and Fabric Finishing and Fabric Coating Mills	402	$1,843,098	$4,591	$10,606,110	0.04%
3141	Textile Furnishings Mills	818	$3,870,400	$4,734	$9,794,328	0.05%
3149	Other Textile Product Mills	2,022	$3,442,371	$1,702	$2,702,841	0.06%
3151	Apparel Knitting Mills	89	$523,876	$5,920	$6,382,954	0.09%
3152	Cut and Sew Apparel Manufacturing	2,480	$4,006,111	$1,616	$2,064,640	0.08%
3159	Apparel Accessories and Other Apparel Manufacturing	286	$574,129	$2,011	$2,548,686	0.08%
3161	Leather and Hide Tanning and Finishing	78	$101,034	$1,304	$7,624,471	0.02%
3162	Footwear Manufacturing	112	$773,050	$6,902	$8,295,065	0.08%
3169	Other Leather and Allied Product Manufacturing	364	$444,901	$1,222	$2,105,457	0.06%
3211	Sawmills and Wood Preservation	1,634	$7,765,268	$4,752	$12,001,150	0.04%
3212	Veneer, Plywood, and Engineered Wood Product Manufacturing	670	$5,091,443	$7,605	$19,759,596	0.04%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
3219	Other Wood Product Manufacturing	4,904	$16,287,680	$3,321	$5,998,996	0.06%
3221	Pulp, Paper, and Paperboard Mills	173	$6,568,365	$37,967	$235,901,294	0.02%
3222	Converted Paper Product Manufacturing	1,787	$12,244,762	$6,854	$34,990,870	0.02%
3231	Printing and Related Support Activities	12,693	$14,738,174	$1,161	$3,996,639	0.03%
3241	Petroleum and Coal Products Manufacturing	1,022	$8,724,306	$8,541	$267,378,536	0.00%
3251	Basic Chemical Manufacturing	1,144	$11,393,676	$9,964	$108,368,479	0.01%
3252	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	681	$8,148,929	$11,966	$91,947,879	0.01%
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	440	$1,670,914	$3,798	$28,466,636	0.01%
3254	Pharmaceutical and Medicine Manufacturing	1,166	$12,270,203	$10,528	$109,652,940	0.01%
3255	Paint, Coating, and Adhesive Manufacturing	873	$4,187,636	$4,800	$29,510,337	0.02%
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing	1,102	$5,589,291	$5,072	$37,391,152	0.01%
3259	Other Chemical Product and Preparation Manufacturing	1,093	$4,806,806	$4,398	$23,897,452	0.02%
3261	Plastics Product Manufacturing	5,149	$35,819,947	$6,957	$22,658,441	0.03%
3262	Rubber Product Manufacturing	880	$6,058,076	$6,888	$21,611,316	0.03%
3271	Clay Product and Refractory Manufacturing	550	$2,002,058	$3,640	$8,078,807	0.05%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
3272	Glass and Glass Product Manufacturing	815	$4,007,533	$4,917	$15,793,703	0.03%
3273	Cement and Concrete Product Manufacturing	4,404	$13,765,912	$3,126	$7,785,632	0.04%
3274	Lime and Gypsum Product Manufacturing	118	$725,364	$6,173	$26,805,595	0.02%
3279	Other Nonmetallic Mineral Product Manufacturing	1,585	$4,779,209	$3,016	$8,864,633	0.03%
3311	Iron and Steel Mills and Ferroalloy Manufacturing	268	$5,962,845	$22,291	$201,642,290	0.01%
3312	Steel Product Manufacturing from Purchased Steel	318	$3,034,850	$9,559	$38,589,534	0.02%
3313	Alumina and Aluminum Production and Processing	210	$2,605,926	$12,409	$61,726,946	0.02%
3314	Nonferrous Metal (except Aluminum) Production and Processing	389	$3,035,679	$7,804	$61,261,580	0.01%
3315	Foundries	796	$5,296,856	$6,654	$20,840,709	0.03%
3321	Forging and Stamping	1,141	$4,199,802	$3,682	$14,958,369	0.02%
3322	Cutlery and Handtool Manufacturing	558	$1,274,207	$2,286	$9,193,550	0.02%
3323	Architectural and Structural Metals Manufacturing	6,472	$23,411,603	$3,618	$8,360,234	0.04%
3324	Boiler, Tank, and Shipping Container Manufacturing	740	$4,557,414	$6,163	$24,162,652	0.03%
3325	Hardware Manufacturing	304	$1,285,814	$4,230	$16,750,859	0.03%
3326	Spring and Wire Product Manufacturing	555	$1,725,936	$3,110	$9,533,258	0.03%
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	11,346	$16,998,778	$1,498	$3,557,493	0.04%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
3328	Coating, Engraving, Heat Treating, and Allied Activities	2,761	$7,251,052	$2,626	$5,616,834	0.05%
3329	Other Fabricated Metal Product Manufacturing	3,063	$12,570,102	$4,104	$12,315,179	0.03%
3331	Agriculture, Construction, and Mining Machinery Manufacturing	1,422	$10,297,500	$7,242	$32,127,400	0.02%
3332	Industrial Machinery Manufacturing	1,534	$4,564,312	$2,976	$12,175,393	0.02%
3333	Commercial and Service Industry Machinery Manufacturing	939	$3,136,561	$3,340	$15,121,049	0.02%
3334	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing	842	$7,964,382	$9,459	$29,965,620	0.03%
3335	Metalworking Machinery Manufacturing	3,159	$5,185,713	$1,642	$6,125,519	0.03%
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	441	$3,614,996	$8,197	$51,409,099	0.02%
3339	Other General Purpose Machinery Manufacturing	2,903	$13,233,407	$4,559	$19,613,189	0.02%
3341	Computer and Peripheral Equipment Manufacturing	449	$841,625	$1,877	$19,085,845	0.01%
3342	Communications Equipment Manufacturing	614	$2,801,459	$4,563	$31,095,928	0.01%
3343	Audio and Video Equipment Manufacturing	227	$293,740	$1,294	$6,807,492	0.02%
3344	Semiconductor and Other Electronic Component Manufacturing	1,900	$8,118,846	$4,273	$27,994,372	0.02%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	2,520	$10,704,689	$4,248	$31,086,340	0.01%
3346	Manufacturing and Reproducing Magnetic and Optical Media	204	$198,879	$977	$4,335,534	0.02%
3351	Electric Lighting Equipment Manufacturing	501	$1,444,609	$2,886	$13,083,478	0.02%
3352	Household Appliance Manufacturing	125	$1,066,209	$8,530	$45,138,353	0.02%
3353	Electrical Equipment Manufacturing	995	$5,832,098	$5,861	$21,618,940	0.03%
3359	Other Electrical Equipment and Component Manufacturing	977	$4,726,132	$4,840	$22,536,250	0.02%
3361	Motor Vehicle Manufacturing	122	$1,085,733	$8,899	$454,487,339	0.00%
3362	Motor Vehicle Body and Trailer Manufacturing	944	$8,246,263	$8,740	$29,205,076	0.03%
3363	Motor Vehicle Parts Manufacturing	2,425	$27,059,128	$11,161	$61,631,308	0.02%
3364	Aerospace Product and Parts Manufacturing	826	$12,167,578	$14,731	$93,792,988	0.02%
3365	Railroad Rolling Stock Manufacturing	104	$1,429,522	$13,812	$63,611,383	0.02%
3366	Ship and Boat Building	721	$11,788,451	$16,361	$21,809,920	0.08%
3369	Other Transportation Equipment Manufacturing	408	$1,037,801	$2,547	$15,117,084	0.02%
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	5,083	$13,274,090	$2,611	$4,297,730	0.06%
3372	Office Furniture (including Fixtures) Manufacturing	1,767	$5,200,805	$2,943	$7,971,335	0.04%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
3379	Other Furniture Related Product Manufacturing	366	$1,792,138	$4,903	$15,572,532	0.03%
3391	Medical Equipment and Supplies Manufacturing	5,090	$13,095,541	$2,573	$10,884,255	0.02%
3399	Other Miscellaneous Manufacturing	8,780	$13,579,420	$1,547	$4,017,213	0.04%
4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	2,351	$26,489,257	$11,269	$45,407,480	0.02%
4232	Furniture and Home Furnishing Merchant Wholesalers	1,298	$9,523,083	$7,336	$10,625,767	0.07%
4233	Lumber and Other Construction Materials Merchant Wholesalers	1,736	$13,456,090	$7,749	$13,371,930	0.06%
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	3,513	$25,485,899	$7,255	$20,295,064	0.04%
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	958	$8,692,950	$9,072	$27,671,464	0.03%
4236	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers	2,879	$28,074,222	$9,752	$27,451,825	0.04%
4237	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers	1,951	$13,236,652	$6,783	$11,557,780	0.06%
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	5,776	$58,234,641	$10,082	$11,596,411	0.09%
4239	Miscellaneous Durable Goods Merchant Wholesalers	3,188	$16,166,409	$5,071	$9,310,978	0.05%
4241	Paper and Paper Product Merchant Wholesalers	967	$8,226,081	$8,507	$19,885,243	0.04%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
4242	Drugs and Druggists' Sundries Merchant Wholesalers	1,019	$14,966,530	$14,683	$110,821,278	0.01%
4243	Apparel, Piece Goods, and Notions Merchant Wholesalers	1,534	$8,083,432	$5,269	$13,145,411	0.04%
4244	Grocery and Related Product Merchant Wholesalers	3,517	$45,101,982	$12,823	$34,945,484	0.04%
4245	Farm Product Raw Material Merchant Wholesalers	613	$4,961,179	$8,089	$41,951,216	0.02%
4246	Chemical and Allied Products Merchant Wholesalers	1,223	$9,926,609	$8,115	$23,780,447	0.03%
4247	Petroleum and Petroleum Products Merchant Wholesalers	638	$6,705,416	$10,506	$203,610,923	0.01%
4248	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	451	$11,640,093	$25,813	$43,026,015	0.06%
4249	Miscellaneous Nondurable Goods Merchant Wholesalers	2,852	$20,258,440	$7,103	$15,167,514	0.05%
4251	Wholesale Trade Agents and Brokers	3,957	$15,142,900	$3,827	$21,159,691	0.02%
4411	Automobile Dealers	7,943	$70,381,781	$8,860	$26,031,796	0.03%
4412	Other Motor Vehicle Dealers	2,484	$10,727,937	$4,319	$6,684,856	0.06%
4413	Automotive Parts, Accessories, and Tire Retailers	10,382	$38,063,251	$3,666	$2,310,332	0.16%
4441	Building Material and Supplies Dealers	10,300	$26,774,594	$2,599	$5,880,598	0.04%
4442	Lawn and Garden Equipment and Supplies Retailers	3,493	$10,491,710	$3,003	$3,918,834	0.08%
4451	Grocery and Convenience Retailers	16,712	$111,429,709	$6,668	$8,142,684	0.08%
4452	Specialty Food Retailers	4,575	$10,190,815	$2,227	$2,565,311	0.09%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
4453	Beer, Wine, and Liquor Retailers	6,050	$7,676,768	$1,269	$2,103,423	0.06%
4491	Furniture and Home Furnishings Retailers	9,532	$20,849,798	$2,187	$3,437,969	0.06%
4492	Electronics and Appliance Retailers	5,359	$13,310,629	$2,484	$3,870,143	0.06%
4551	Department Stores	892	$11,243,234	$12,610	$17,685,253	0.07%
4552	Warehouse Clubs, Supercenters, and Other General Merchandise Retailers	9,875	$55,995,417	$5,670	$12,141,433	0.05%
4561	Health and Personal Care Retailers	17,607	$26,342,201	$1,496	$4,568,247	0.03%
4571	Gasoline Stations	18,856	$34,130,245	$1,810	$5,062,894	0.04%
4572	Fuel Dealers	1,393	$2,870,053	$2,061	$4,568,306	0.05%
4581	Clothing and Clothing Accessories Retailers	16,339	$44,247,522	$2,708	$2,473,681	0.11%
4582	Shoe Retailers	4,397	$9,190,469	$2,090	$2,227,506	0.09%
4583	Jewelry, Luggage, and Leather Goods Retailers	4,259	$6,611,743	$1,552	$2,704,423	0.06%
4591	Sporting Goods, Hobby, and Musical Instrument Retailers	7,353	$16,879,497	$2,296	$3,294,022	0.07%
4592	Book Retailers and News Dealers	1,515	$3,229,542	$2,131	$2,950,989	0.07%
4593	Florists	2,383	$4,426,367	$1,857	$1,442,716	0.13%
4594	Office Supplies, Stationery, and Gift Retailers	5,104	$10,013,108	$1,962	$2,084,249	0.09%
4595	Used Merchandise Retailers	3,668	$7,796,516	$2,126	$1,521,114	0.14%
4599	Other Miscellaneous Retailers	8,050	$15,263,208	$1,896	$2,640,719	0.07%
4811	Scheduled Air Transportation	1,901	$25,658,803	$13,497	$89,545,214	0.02%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
4812	Nonscheduled Air Transportation	1,825	$4,628,067	$2,535	$11,544,951	0.02%
4821	Rail Transportation	119	$124,334	$1,041	$2,215,217	0.05%
4831	Deep Sea, Coastal, and Great Lakes Water Transportation	877	$5,042,806	$5,750	$36,316,671	0.02%
4832	Inland Water Transportation	476	$3,118,127	$6,552	$11,566,749	0.06%
4841	General Freight Trucking	64,907	$89,062,119	$1,372	$3,024,850	0.05%
4842	Specialized Freight Trucking	42,255	$50,978,497	$1,206	$2,422,016	0.05%
4851	Urban Transit Systems	782	$1,541,702	$1,972	$5,727,178	0.03%
4852	Interurban and Rural Bus Transportation	670	$1,142,712	$1,705	$3,183,166	0.05%
4853	Taxi and Limousine Service	6,647	$7,550,221	$1,136	$2,114,168	0.05%
4854	School and Employee Bus Transportation	3,712	$6,449,362	$1,737	$2,931,452	0.06%
4855	Charter Bus Industry	1,069	$1,792,372	$1,677	$3,278,126	0.05%
4859	Other Transit and Ground Passenger Transportation	4,351	$3,709,249	$852	$1,757,646	0.05%
4861	Pipeline Transportation of Crude Oil	649	$1,410,922	$2,174	$13,170,788	0.02%
4862	Pipeline Transportation of Natural Gas	1,812	$4,248,289	$2,345	$15,487,431	0.02%
4869	Other Pipeline Transportation	580	$1,250,571	$2,156	$14,063,673	0.02%
4871	Scenic and Sightseeing Transportation, Land	617	$1,320,235	$2,139	$2,100,659	0.10%
4872	Scenic and Sightseeing Transportation, Water	1,554	$3,274,995	$2,108	$1,392,280	0.15%
4879	Scenic and Sightseeing Transportation, Other	268	$510,004	$1,901	$2,851,407	0.07%
4881	Support Activities for Air Transportation	5,046	$22,255,588	$4,410	$5,491,720	0.08%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
4882	Support Activities for Rail Transportation	1,293	$4,921,648	$3,806	$4,754,766	0.08%
4883	Support Activities for Water Transportation	2,258	$11,495,850	$5,092	$8,269,227	0.06%
4884	Support Activities for Road Transportation	10,553	$8,555,879	$811	$1,051,046	0.08%
4885	Freight Transportation Arrangement	18,079	$29,423,164	$1,627	$3,691,452	0.04%
4889	Other Support Activities for Transportation	1,434	$1,669,460	$1,165	$1,708,634	0.07%
4911	Postal Service	25,465	$28,299,988	$1,111	$5,242,980	0.02%
4921	Couriers and Express Delivery Services	8,360	$24,629,329	$2,946	$9,114,393	0.03%
4922	Local Messengers and Local Delivery	3,780	$3,385,960	$896	$1,707,066	0.05%
4931	Warehousing and Storage	14,274	$58,725,115	$4,114	$2,766,853	0.15%
5121	Motion Picture and Video Industries	3,012	$16,428,008	$5,454	$5,083,819	0.11%
5122	Sound Recording Industries	489	$1,147,515	$2,346	$4,484,294	0.05%
5131	Newspaper, Periodical, Book, and Directory Publishers	3,052	$20,020,700	$6,559	$11,229,220	0.06%
5132	Software Publishers	1,821	$13,284,155	$7,296	$25,213,904	0.03%
5161	Radio and Television Broadcasting Stations	778	$9,163,332	$11,786	$8,807,054	0.13%
5162	Media Streaming Distribution Services, Social Networks, and Other Media Networks and Content Providers	533	$6,637,578	$12,460	$44,140,119	0.03%
5171	Wired and Wireless Telecommunications (except Satellite)	7,811	$49,672,322	$6,360	$12,522,782	0.05%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
5174	Satellite Telecommunications	59	$491,286	$8,376	$14,838,437	0.06%
5178	All Other Telecommunications	358	$2,013,640	$5,620	$9,959,665	0.06%
5182	Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services	2,409	$13,757,855	$5,712	$11,018,831	0.05%
5192	Web Search Portals, Libraries, Archives, and Other Information Services	611	$1,902,061	$3,111	$6,745,774	0.05%
5221	Depository Credit Intermediation	16,260	$66,680,457	$4,101	$5,815,480	0.07%
5222	Nondepository Credit Intermediation	6,274	$23,451,028	$3,738	$10,353,450	0.04%
5223	Activities Related to Credit Intermediation	3,968	$13,782,701	$3,473	$5,998,640	0.06%
5231	Securities and Commodity Contracts Intermediation and Brokerage	3,942	$12,199,622	$3,095	$10,423,406	0.03%
5232	Securities and Commodity Exchanges	4	$62,437	$13,904	$411,532,288	0.00%
5239	Other Financial Investment Activities	10,124	$23,123,395	$2,284	$5,472,042	0.04%
5241	Insurance Carriers	4,350	$35,116,961	$8,073	$74,913,679	0.01%
5242	Agencies, Brokerages, and Other Insurance Related Activities	20,264	$50,123,045	$2,474	$2,715,515	0.09%
5251	Insurance and Employee Benefit Funds	236	$527,154	$2,237	$3,562,001	0.06%
5259	Other Investment Pools and Funds	123	$255,212	$2,079	$2,004,745	0.10%
5311	Lessors of Real Estate	17,809	$50,853,115	$2,855	$2,394,282	0.12%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
5312	Offices of Real Estate Agents and Brokers	16,673	$36,947,635	$2,216	$1,136,243	0.20%
5313	Activities Related to Real Estate	13,274	$53,336,543	$4,018	$1,215,258	0.33%
5321	Automotive Equipment Rental and Leasing	2,256	$15,749,238	$6,981	$4,088,904	0.17%
5322	Consumer Goods Rental	2,693	$10,999,021	$4,085	$1,173,984	0.35%
5323	General Rental Centers	420	$1,665,083	$3,969	$1,486,508	0.27%
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	2,130	$13,168,084	$6,182	$5,500,482	0.11%
5331	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	377	$1,245,184	$3,303	$19,386,258	0.02%
5411	Legal Services	25,571	$52,480,381	$2,052	$1,941,967	0.11%
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	18,287	$48,179,649	$2,635	$1,396,296	0.19%
5413	Architectural, Engineering, and Related Services	15,623	$174,866,256	$11,193	$3,312,024	0.34%
5414	Specialized Design Services	4,494	$13,137,406	$2,923	$931,984	0.31%
5415	Computer Systems Design and Related Services	19,606	$79,048,499	$4,032	$3,773,095	0.11%
5416	Management, Scientific, and Technical Consulting Services	24,060	$100,628,588	$4,182	$1,787,507	0.23%
5417	Scientific Research and Development Services	2,556	$33,102,069	$12,948	$10,398,760	0.12%
5418	Advertising, Public Relations, and Related Services	5,218	$30,433,443	$5,833	$3,373,336	0.17%
5419	Other Professional, Scientific, and Technical Services	9,861	$64,294,316	$6,520	$1,535,518	0.42%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
5511	Management of Companies and Enterprises	7,687	$181,889,901	$23,662	$2,601,094	0.91%
5611	Office Administrative Services	4,694	$13,289,558	$2,831	$2,192,216	0.13%
5612	Facilities Support Services	928	$17,834,897	$19,228	$5,252,912	0.37%
5613	Employment Services	7,276	$344,829,125	$47,393	$8,776,960	0.54%
5614	Business Support Services	4,372	$13,798,527	$3,156	$2,727,986	0.12%
5615	Travel Arrangement and Reservation Services	3,108	$6,673,364	$2,147	$2,592,365	0.08%
5616	Investigation and Security Services	3,513	$73,921,446	$21,042	$2,971,429	0.71%
5617	Services to Buildings and Dwellings	27,351	$173,828,441	$6,355	$922,181	0.69%
5619	Other Support Services	2,751	$17,358,050	$6,309	$2,809,043	0.22%
5621	Waste Collection	1,605	$5,725,756	$3,567	$5,516,059	0.06%
5622	Waste Treatment and Disposal	358	$2,044,381	$5,704	$6,960,982	0.08%
5629	Remediation and Other Waste Management Services	1,496	$10,192,723	$6,814	$3,165,201	0.22%
6111	Elementary and Secondary Schools	3,291	$40,472,071	$12,297	$4,413,940	0.28%
6112	Junior Colleges	120	$1,194,543	$9,970	$8,501,343	0.12%
6113	Colleges, Universities, and Professional Schools	661	$32,001,201	$48,400	$69,334,614	0.07%
6114	Business Schools and Computer and Management Training	1,248	$2,668,673	$2,138	$1,826,775	0.12%
6115	Technical and Trade Schools	1,228	$4,444,652	$3,619	$1,991,961	0.18%
6116	Other Schools and Instruction	7,639	$17,939,335	$2,348	$592,020	0.40%
6117	Educational Support Services	1,310	$3,196,265	$2,439	$2,241,261	0.11%
6211	Offices of Physicians	9,917	$25,952,877	$2,617	$2,598,098	0.10%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
6212	Offices of Dentists	6,017	$16,631,978	$2,764	$1,123,388	0.25%
6213	Offices of Other Health Practitioners	6,967	$15,574,576	$2,235	$650,896	0.34%
6214	Outpatient Care Centers	2,008	$14,460,890	$7,201	$4,256,944	0.17%
6215	Medical and Diagnostic Laboratories	767	$4,775,293	$6,226	$3,788,420	0.16%
6216	Home Health Care Services	1,474	$39,821,728	$27,010	$3,024,173	0.89%
6219	Other Ambulatory Health Care Services	507	$6,057,721	$11,957	$4,132,554	0.29%
6221	General Medical and Surgical Hospitals	245	$65,020,765	$265,020	$218,034,685	0.12%
6222	Psychiatric and Substance Abuse Hospitals	27	$5,602,159	$207,993	$45,105,867	0.46%
6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	37	$3,694,704	$99,601	$61,909,640	0.16%
6231	Nursing Care Facilities (Skilled Nursing Facilities)	752	$35,736,039	$47,496	$8,679,090	0.55%
6232	Residential Intellectual and Developmental Disability, Mental Health, and Substance Abuse Facilities	1,863	$22,918,890	$12,302	$1,273,215	0.97%
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	1,120	$26,868,839	$23,984	$3,060,931	0.78%
6239	Other Residential Care Facilities	227	$4,128,616	$18,174	$1,856,976	0.98%
6241	Individual and Family Services	3,329	$57,309,240	$17,218	$1,658,588	1.04%
6242	Community Food and Housing, and Emergency and Other Relief Services	650	$6,458,493	$9,929	$2,982,906	0.33%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
6243	Vocational Rehabilitation Services	328	$7,785,986	$23,739	$2,100,542	1.13%
6244	Child Care Services	3,406	$61,315,616	$18,003	$652,479	2.76%
7111	Performing Arts Companies	4,832	$6,157,218	$1,274	$2,085,725	0.06%
7112	Spectator Sports	2,206	$5,962,390	$2,703	$12,928,871	0.02%
7113	Promoters of Performing Arts, Sports, and Similar Events	4,362	$8,735,781	$2,003	$4,539,819	0.04%
7114	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures	2,223	$2,215,936	$997	$2,365,997	0.04%
7115	Independent Artists, Writers, and Performers	15,379	$14,540,701	$945	$848,451	0.11%
7121	Museums, Historical Sites, and Similar Institutions	4,091	$7,846,087	$1,918	$3,102,080	0.06%
7131	Amusement Parks and Arcades	2,347	$15,577,978	$6,639	$5,344,729	0.12%
7132	Gambling Industries	1,638	$3,926,485	$2,398	$9,343,172	0.03%
7139	Other Amusement and Recreation Industries	39,654	$70,323,368	$1,773	$1,310,750	0.14%
7211	Traveler Accommodation	21,598	$63,177,043	$2,925	$5,123,987	0.06%
7212	RV (Recreational Vehicle) Parks and Recreational Camps	2,754	$2,698,715	$980	$1,029,528	0.10%
7213	Rooming and Boarding Houses, Dormitories, and Workers' Camps	746	$791,148	$1,061	$994,545	0.11%
7223	Special Food Services	16,532	$29,428,448	$1,780	$1,586,703	0.11%
7224	Drinking Places (Alcoholic Beverages)	14,785	$14,060,549	$951	$739,078	0.13%
7225	Restaurants and Other Eating Places	210,896	$409,134,932	$1,940	$1,274,637	0.15%
8111	Automotive Repair and Maintenance	74,001	$126,236,663	$1,706	$873,479	0.20%

Table VIII.D.1. Economic Impacts on Establishments Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Establishments	Total Annualized Costs	Average Annualized Cost per Establishment	Average Revenue per Establishment	Costs as % of Revenue
8112	Electronic and Precision Equipment Repair and Maintenance	5,811	$11,875,534	$2,044	$1,945,895	0.11%
8113	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	9,972	$25,065,047	$2,514	$2,202,353	0.11%
8114	Personal and Household Goods Repair and Maintenance	9,830	$12,454,292	$1,267	$559,118	0.23%
8121	Personal Care Services	60,820	$71,616,377	$1,178	$360,641	0.33%
8122	Death Care Services	9,602	$18,086,417	$1,884	$1,109,180	0.17%
8123	Drycleaning and Laundry Services	15,411	$21,745,744	$1,411	$916,522	0.15%
8129	Other Personal Services	21,448	$31,265,564	$1,458	$691,008	0.21%
8131	Religious Organizations	84,819	$139,934,279	$1,650	$975,827	0.17%
8132	Grantmaking and Giving Services	9,147	$11,510,923	$1,258	$7,324,606	0.02%
8133	Social Advocacy Organizations	8,168	$11,803,888	$1,445	$2,343,993	0.06%
8134	Civic and Social Organizations	12,043	$18,907,950	$1,570	$859,416	0.18%
8139	Business, Professional, Labor, Political, and Similar Organizations	26,876	$37,917,962	$1,411	$2,057,484	0.07%
9992	State Government	8	$169,386,525	$20,359,760	$80,797,224,446	0.03%
9993	Local Government	5,172	$504,582,765	$97,561	$64,081,034	0.15%
Total		**2,535,774**	**$7,823,661,638**	**$3,085**	**$7,392,091**	**0.04%**

B. Economic Feasibility Screening Analysis: Small and Very Small Entities.

The preceding discussion focused on the economic viability of each affected industry in its entirety, including entities of all sizes. Even though OSHA has found that the proposed standard does not threaten the economic viability of these industries, the agency also examines whether there is still a possibility that the competitive structure of these industries could be significantly altered. For instance, in some industries, if most or all small firms in that industry would have to close, it could reasonably be concluded that the competitive structure of the industry had been affected by the proposed standard.

To address this possibility, OSHA examines the average compliance costs per affected small entity and very small entity for each industry covered under the final standard. See Section VIII.B., Profile of Affected Industries for a discussion of OSHA's methodology for estimating the number of small and very small entities.

As with its analysis of all establishments, the agency relies on a screening test—costs less than one percent of revenue—to evaluate the impacts on small and very small entities.[94] As with the screening tests for establishments of all sizes, in cases where the small and very small entities in particular industries are above the threshold level for the primary screening test, OSHA will investigate further.

OSHA notes that cost impacts for affected small or very small entities will generally tend to be somewhat higher, on average, than the cost impacts for the average

[94] The agency calculates the average per-entity revenues for small and very small entities in each NAICS industry in the same manner that it calculated the average per-establishment revenues for its analysis of all establishments, above.

business in those affected industries. That is to be expected. After all, smaller businesses typically suffer from diseconomies of scale in many aspects of their business, leading to lower revenue per dollar of cost and higher average costs. Small businesses are able to overcome these obstacles by providing specialized products and services, offering local service and better service, or otherwise creating a market niche for themselves. In a dynamic environment, they also tend to benefit from less institutional inertia. The higher cost impacts for smaller businesses estimated for this standard generally fall within the range observed in other OSHA standards, and OSHA is not aware of any record of major industry failures resulting from those standards.[95] For industries that are below the thresholds for the cost-to-revenue test, the agency concludes that the costs of complying with the proposed standard are unlikely to threaten the survival of small entities or very small entities and are, consequently, unlikely to alter the competitive structure of the affected industries.

As discussed further in Section VIII.F., Initial Regulatory Flexibility Analysis, the agency is required by the Regulatory Flexibility Act to determine whether a proposed standard would likely have a significant economic impact on a substantial number of small entities. As an extension of the feasibility screening analysis, the agency also performed a screening analysis of costs as a percentage of revenues of small entities. Table VIII.D.2. and Table VIII.D.3. show that parallel to the previous analysis of costs as

[95] For example, OSHA's economic analysis for the agency's 2016 Silica rule showed cost-to-revenue ratios as high as 1.29 percent for small entities and 2.09 percent for very small entities (see OSHA's *Final Economic and Regulatory Flexibility Analysis* for its Silica rule, Chapter VI, Tables VI-7 and VI-8, pp. VI-87-VI-94, Document ID OSHA-2010-0034-4247, attachment 6).

percent of average revenues for all establishments, for all but seven (out of 298) of the covered NAICS industries, the cost-to-revenue ratios are generally well below OSHA's screening threshold of one percent, suggesting that compliance with this standard would be feasible for small and very small entities in all of these industries. Since the impact is somewhat higher on average to small entities, two industries, Home Health Care Services (NAICS 6216) and Other Residential Care Facilities (NAICS 6239), had costs marginally above one percent, in addition to the five listed previously for the feasibility screening test for all establishments. A slightly different mix (four of 298) presents for Very Small Entities, the two agriculture industries listed previously and two of the four health care and social service industries, Other Residential Care Facilities (NAICS 6239) and Child Care Services (NAICS 6244) having costs of more than one percent as a percent of revenues.

While the impacts are marginally greater for small entities, the general profile does not differ significantly from the issues with larger entities, suggesting that the proposed standard does not pose unique challenges for small entities. (This result is consistent with the costs being overwhelmingly employee based, as opposed to establishment based (see Section VIII.C., Costs of Compliance)).

Table VIII.D.2. shows that the estimated average cost of complying with the proposed standard for the average small entity in all industries covered by the standard is $1,946 annually, and Table VIII.D.3. shows that the estimated average cost of the standard for the average very small entity is $1,178 annually.

The tables further show that for all small entities in covered NAICS industries, the cost-to-revenue ratios are below OSHA's one percent screening threshold, except for the seven industries previously discussed, suggesting that compliance with this proposed standard would be feasible for small entities in these industries.

As is typical with new requirements, the costs will be borne primarily by those businesses that have lagged in implementing safety measures. See *Lead I*, 647 F.2d at 1265 ("'It would appear to be consistent with the purposes of the [OSH] Act to envisage the economic demise of an employer who has lagged behind the rest of the industry in protecting the health and safety of employees and is consequently financially unable to comply with new standards as quickly as other employers.'") (quoting *Indus. Union Dep't, AFL-CIO v. Hodgson*, 499 F.2d 467, 478 (D.C. Cir. 1974)). Indeed, one of the main differentiations between businesses similarly situated in the same industry, where one would be exempt from this proposed standard while the other would not, would be in situations where one employer has invested in air conditioning that keeps their facility below the heat trigger while the other has forgone those investments. The businesses that have already incurred many of the costs of compliance will presumably be at low risk of going out of business as a result of the standard. Even when small or very small entities in particular industries are above the revenue screening threshold, it would be very unlikely that this proposed standard would result in the alteration of the economic structure of these industries based on the failure of most or all of the small or very small entities in those industries.

Moreover, OSHA has considered input from SBA-defined small entities who participated in the SBREFA process, with regard to the potential provisions of a regulatory framework for a heat standard. OSHA's adjustments to the regulatory framework presented during the panel, along with a set of regulatory alternatives and options drafted and analyzed in response to recommendations from the SBAR Panel, are also discussed in Section VIII.F., Initial Regulatory Flexibility Analysis.

Disclaimer: This proposed rule has been submitted to the Office of the Federal Register (OFR) for publication, and is currently pending placement on public inspection at the OFR and publication in the Federal Register. This draft version of the proposed rule may vary slightly from the published document if minor technical or formatting changes are made during the OFR review process. Only the version published in the Federal Register is the official proposed rule.

Table VIII.D.2. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
1111	Oilseed and Grain Farming	12,511	$13,585,428	$1,086	$759,359	0.14%
1112	Vegetable and Melon Farming	2,127	$9,980,549	$4,693	$1,153,664	0.41%
1113	Fruit and Tree Nut Farming	6,121	$14,284,547	$2,334	$682,745	0.34%
1114	Greenhouse, Nursery, and Floriculture Production	2,720	$12,359,299	$4,544	$741,146	0.61%
1119	Other Crop Farming	9,564	$15,497,239	$1,620	$282,465	0.57%
1121	Cattle Ranching and Farming	18,428	$28,781,484	$1,562	$700,078	0.22%
1122	Hog and Pig Farming	1,048	$2,182,612	$2,082	$2,601,611	0.08%
1123	Poultry and Egg Production	2,278	$4,700,946	$2,064	$2,939,009	0.07%
1124	Sheep and Goat Farming	1,548	$2,393,222	$1,546	$88,910	1.74%
1125	Aquaculture	160	$616,482	$3,859	$1,133,734	0.34%
1129	Other Animal Production	4,913	$7,999,112	$1,628	$115,067	1.41%
1131	Timber Tract Operations	442	$439,946	$996	$1,501,147	0.07%
1132	Forest Nurseries and Gathering of Forest Products	150	$152,566	$1,017	$790,399	0.13%
1133	Logging	7,980	$7,648,751	$958	$1,563,286	0.06%
1141	Fishing	2,432	$1,113,045	$458	$853,204	0.05%
1142	Hunting and Trapping	351	$374,292	$1,066	$799,221	0.13%
1151	Support Activities for Crop Production	4,648	$5,853,520	$1,259	$2,707,767	0.05%
1152	Support Activities for Animal Production	4,640	$3,376,198	$728	$506,802	0.14%
1153	Support Activities for Forestry	1,658	$1,398,749	$844	$1,111,045	0.08%
2111	Oil and Gas Extraction	5,307	$16,476,736	$3,105	$26,579,145	0.01%
2131	Support Activities for Mining	10,921	$43,981,568	$4,027	$3,821,423	0.11%
2211	Electric Power Generation, Transmission and Distribution	2,058	$28,171,559	$13,690	$76,221,412	0.02%
2212	Natural Gas Distribution	418	$3,527,573	$8,436	$70,106,856	0.01%
2213	Water, Sewage and Other Systems	3,668	$7,573,926	$2,065	$1,410,992	0.15%
2361	Residential Building Construction	171,099	$106,947,179	$625	$1,421,852	0.04%

Table VIII.D.2. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
2362	Nonresidential Building Construction	40,735	$62,520,995	$1,535	$6,719,320	0.02%
2371	Utility System Construction	16,774	$34,191,049	$2,038	$3,633,655	0.06%
2372	Land Subdivision	4,805	$3,170,977	$660	$1,877,172	0.04%
2373	Highway, Street, and Bridge Construction	8,285	$17,087,777	$2,062	$6,724,608	0.03%
2379	Other Heavy and Civil Engineering Construction	4,056	$6,569,839	$1,620	$3,024,764	0.05%
2381	Foundation, Structure, and Building Exterior Contractors	91,279	$125,277,109	$1,372	$1,699,487	0.08%
2382	Building Equipment Contractors	177,612	$233,824,679	$1,316	$1,621,258	0.08%
2383	Building Finishing Contractors	114,496	$106,453,318	$930	$1,078,107	0.09%
2389	Other Specialty Trade Contractors	68,126	$72,672,079	$1,067	$1,929,027	0.06%
3111	Animal Food Manufacturing	636	$1,601,425	$2,520	$24,357,224	0.01%
3112	Grain and Oilseed Milling	250	$1,211,561	$4,854	$62,037,403	0.01%
3113	Sugar and Confectionery Product Manufacturing	868	$2,204,453	$2,539	$9,556,299	0.03%
3114	Fruit and Vegetable Preserving and Specialty Food Manufacturing	743	$3,725,663	$5,016	$25,690,434	0.02%
3115	Dairy Product Manufacturing	588	$2,637,411	$4,484	$49,929,979	0.01%
3116	Animal Slaughtering and Processing	1,456	$12,280,924	$8,438	$38,292,294	0.02%
3117	Seafood Product Preparation and Packaging	221	$902,567	$4,087	$22,008,470	0.02%
3118	Bakeries and Tortilla Manufacturing	5,471	$11,517,147	$2,105	$3,818,211	0.06%
3119	Other Food Manufacturing	1,655	$5,268,917	$3,183	$16,374,321	0.02%
3121	Beverage Manufacturing	4,226	$6,542,557	$1,548	$8,758,819	0.02%
3122	Tobacco Manufacturing	58	$515,881	$8,848	$182,294,825	0.00%
3131	Fiber, Yarn, and Thread Mills	102	$1,037,014	$10,139	$19,374,286	0.05%
3132	Fabric Mills	345	$1,937,288	$5,609	$12,945,642	0.04%

Table VIII.D.2. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3133	Textile and Fabric Finishing and Fabric Coating Mills	378	$1,346,267	$3,565	$7,871,921	0.05%
3141	Textile Furnishings Mills	769	$2,410,151	$3,134	$5,547,861	0.06%
3149	Other Textile Product Mills	1,981	$2,870,758	$1,449	$2,012,712	0.07%
3152	Cut and Sew Apparel Manufacturing	1,485	$1,708,817	$1,151	$907,132	0.13%
3159	Apparel Accessories and Other Apparel Manufacturing	279	$488,329	$1,750	$1,772,440	0.10%
3161	Leather and Hide Tanning and Finishing	75	$78,767	$1,048	$6,384,614	0.02%
3162	Footwear Manufacturing	102	$410,499	$4,029	$5,074,485	0.08%
3211	Sawmills and Wood Preservation	1,425	$5,001,937	$3,510	$7,582,835	0.05%
3212	Veneer, Plywood, and Engineered Wood Product Manufacturing	169	$1,273,144	$7,533	$21,682,868	0.03%
3219	Other Wood Product Manufacturing	4,412	$11,586,726	$2,626	$4,072,371	0.06%
3221	Pulp, Paper, and Paperboard Mills	35	$855,082	$24,193	$136,863,576	0.02%
3222	Converted Paper Product Manufacturing	1,264	$6,774,484	$5,360	$24,890,031	0.02%
3231	Printing and Related Support Activities	12,027	$11,573,349	$962	$2,522,782	0.04%
3241	Petroleum and Coal Products Manufacturing	464	$3,199,326	$6,895	$177,980,216	0.00%
3251	Basic Chemical Manufacturing	642	$4,655,288	$7,251	$78,530,261	0.01%
3252	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	530	$4,077,855	$7,695	$52,682,176	0.01%
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	355	$1,140,904	$3,217	$18,940,264	0.02%
3254	Pharmaceutical and Medicine Manufacturing	925	$5,779,821	$6,251	$51,766,648	0.01%
3255	Paint, Coating, and Adhesive Manufacturing	705	$2,479,397	$3,516	$16,249,794	0.02%

Table VIII.D.2. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing	1,002	$3,477,371	$3,470	$17,908,986	0.02%
3259	Other Chemical Product and Preparation Manufacturing	872	$2,542,871	$2,916	$12,165,378	0.02%
3261	Plastics Product Manufacturing	4,134	$19,980,060	$4,833	$13,921,131	0.03%
3262	Rubber Product Manufacturing	699	$3,192,709	$4,565	$12,772,546	0.04%
3271	Clay Product and Refractory Manufacturing	463	$1,199,726	$2,590	$5,587,274	0.05%
3272	Glass and Glass Product Manufacturing	706	$1,989,379	$2,819	$6,976,531	0.04%
3273	Cement and Concrete Product Manufacturing	2,173	$8,394,899	$3,863	$8,676,117	0.04%
3274	Lime and Gypsum Product Manufacturing	74	$303,318	$4,126	$15,209,592	0.03%
3279	Other Nonmetallic Mineral Product Manufacturing	1,369	$3,198,469	$2,336	$5,186,460	0.05%
3311	Iron and Steel Mills and Ferroalloy Manufacturing	191	$2,633,059	$13,753	$115,596,140	0.01%
3312	Steel Product Manufacturing from Purchased Steel	246	$1,720,852	$6,991	$28,374,263	0.02%
3313	Alumina and Aluminum Production and Processing	155	$1,282,335	$8,290	$35,439,130	0.02%
3314	Nonferrous Metal (except Aluminum) Production and Processing	309	$1,616,110	$5,227	$39,316,152	0.01%
3315	Foundries	691	$2,989,596	$4,329	$11,281,321	0.04%
3321	Forging and Stamping	991	$2,784,200	$2,810	$10,193,180	0.03%
3322	Cutlery and Handtool Manufacturing	529	$928,777	$1,755	$5,517,119	0.03%
3323	Architectural and Structural Metals Manufacturing	5,974	$16,517,707	$2,765	$5,735,883	0.05%
3324	Boiler, Tank, and Shipping Container Manufacturing	589	$2,689,023	$4,567	$12,577,513	0.04%

Table VIII.D.2. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3325	Hardware Manufacturing	272	$770,518	$2,836	$8,866,155	0.03%
3326	Spring and Wire Product Manufacturing	492	$1,152,112	$2,340	$6,269,990	0.04%
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	11,032	$15,208,419	$1,379	$2,901,748	0.05%
3328	Coating, Engraving, Heat Treating, and Allied Activities	2,521	$5,835,961	$2,315	$4,178,955	0.06%
3329	Other Fabricated Metal Product Manufacturing	2,806	$7,766,243	$2,767	$7,493,462	0.04%
3331	Agriculture, Construction, and Mining Machinery Manufacturing	1,247	$5,944,680	$4,766	$18,417,556	0.03%
3332	Industrial Machinery Manufacturing	425	$1,030,865	$2,425	$10,195,646	0.02%
3334	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing	699	$3,921,041	$5,609	$15,601,508	0.04%
3335	Metalworking Machinery Manufacturing	3,010	$4,202,594	$1,396	$4,357,322	0.03%
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	337	$1,582,741	$4,698	$25,365,617	0.02%
3339	Other General Purpose Machinery Manufacturing	1,762	$5,979,770	$3,394	$12,034,903	0.03%
3341	Computer and Peripheral Equipment Manufacturing	415	$490,089	$1,182	$8,911,705	0.01%
3342	Communications Equipment Manufacturing	547	$1,256,142	$2,294	$13,522,113	0.02%
3343	Audio and Video Equipment Manufacturing	219	$262,564	$1,198	$5,604,208	0.02%
3344	Semiconductor and Other Electronic Component Manufacturing	1,680	$4,552,187	$2,709	$13,079,398	0.02%

Table VIII.D.2. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	2,157	$4,626,878	$2,145	$12,820,769	0.02%
3352	Household Appliance Manufacturing	101	$332,021	$3,290	$14,304,913	0.02%
3353	Electrical Equipment Manufacturing	852	$2,906,501	$3,411	$10,715,020	0.03%
3359	Other Electrical Equipment and Component Manufacturing	752	$2,497,573	$3,319	$12,404,672	0.03%
3361	Motor Vehicle Manufacturing	23	$51,856	$2,260	$58,221,416	0.00%
3362	Motor Vehicle Body and Trailer Manufacturing	803	$4,874,596	$6,071	$15,741,094	0.04%
3363	Motor Vehicle Parts Manufacturing	1,978	$13,487,337	$6,817	$32,394,740	0.02%
3364	Aerospace Product and Parts Manufacturing	646	$3,977,519	$6,160	$29,941,829	0.02%
3365	Railroad Rolling Stock Manufacturing	74	$567,108	$7,707	$33,655,605	0.02%
3366	Ship and Boat Building	658	$7,118,392	$10,818	$14,164,896	0.08%
3369	Other Transportation Equipment Manufacturing	392	$641,075	$1,635	$6,718,062	0.02%
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	4,766	$9,401,064	$1,972	$2,859,010	0.07%
3372	Office Furniture (including Fixtures) Manufacturing	1,690	$3,989,090	$2,360	$5,125,287	0.05%
3379	Other Furniture Related Product Manufacturing	326	$1,166,170	$3,581	$8,591,445	0.04%
3391	Medical Equipment and Supplies Manufacturing	4,621	$7,495,312	$1,622	$4,733,183	0.03%
3399	Other Miscellaneous Manufacturing	8,582	$11,161,673	$1,301	$2,660,648	0.05%
4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	1,544	$11,511,623	$7,456	$8,053,146	0.09%
4232	Furniture and Home Furnishing Merchant Wholesalers	1,077	$5,781,729	$5,367	$5,828,655	0.09%

Table VIII.D.2. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
4233	Lumber and Other Construction Materials Merchant Wholesalers	993	$5,631,821	$5,671	$6,885,143	0.08%
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	2,259	$10,168,859	$4,501	$5,929,082	0.08%
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	709	$4,763,004	$6,715	$13,288,617	0.05%
4236	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers	1,907	$11,364,290	$5,960	$8,540,329	0.07%
4237	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers	1,026	$5,820,745	$5,674	$6,361,789	0.09%
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	4,033	$29,834,160	$7,398	$5,737,517	0.13%
4239	Miscellaneous Durable Goods Merchant Wholesalers	2,831	$10,561,663	$3,731	$5,222,434	0.07%
4241	Paper and Paper Product Merchant Wholesalers	717	$3,784,639	$5,277	$5,821,550	0.09%
4242	Drugs and Druggists' Sundries Merchant Wholesalers	662	$4,340,575	$6,561	$10,574,055	0.06%
4243	Apparel, Piece Goods, and Notions Merchant Wholesalers	386	$1,344,807	$3,483	$5,167,182	0.07%
4244	Grocery and Related Product Merchant Wholesalers	2,662	$15,934,090	$5,986	$10,630,078	0.06%
4245	Farm Product Raw Material Merchant Wholesalers	325	$2,641,457	$8,119	$23,756,996	0.03%
4246	Chemical and Allied Products Merchant Wholesalers	809	$4,315,458	$5,336	$8,980,738	0.06%
4247	Petroleum and Petroleum Products Merchant Wholesalers	376	$3,206,820	$8,522	$61,864,570	0.01%

Table VIII.D.2. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
4248	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	326	$3,172,050	$9,724	$13,306,719	0.07%
4249	Miscellaneous Nondurable Goods Merchant Wholesalers	2,124	$10,353,521	$4,876	$5,895,079	0.08%
4251	Wholesale Trade Agents and Brokers	3,749	$9,368,912	$2,499	$12,764,272	0.02%
4411	Automobile Dealers	6,500	$37,276,607	$5,735	$15,961,277	0.04%
4412	Other Motor Vehicle Dealers	955	$3,490,111	$3,656	$5,414,403	0.07%
4441	Building Material and Supplies Dealers	544	$1,021,683	$1,877	$2,831,193	0.07%
4451	Grocery and Convenience Retailers	6,886	$22,913,996	$3,328	$3,311,379	0.10%
4452	Specialty Food Retailers	1,180	$2,429,585	$2,059	$1,053,778	0.20%
4811	Scheduled Air Transportation	727	$10,339,037	$14,225	$97,899,634	0.01%
4812	Nonscheduled Air Transportation	1,637	$3,179,136	$1,942	$6,496,273	0.03%
4821	Rail Transportation	113	$78,448	$697	$1,132,927	0.06%
4831	Deep Sea, Coastal, and Great Lakes Water Transportation	606	$2,154,113	$3,553	$16,994,169	0.02%
4832	Inland Water Transportation	410	$1,791,814	$4,371	$6,386,189	0.07%
4841	General Freight Trucking	55,843	$50,365,637	$902	$1,458,914	0.06%
4842	Specialized Freight Trucking	39,386	$41,886,506	$1,063	$1,812,364	0.06%
4851	Urban Transit Systems	513	$590,618	$1,151	$2,151,325	0.05%
4852	Interurban and Rural Bus Transportation	488	$896,937	$1,837	$2,488,321	0.07%
4853	Taxi and Limousine Service	6,453	$7,243,177	$1,122	$862,937	0.13%
4854	School and Employee Bus Transportation	2,232	$3,191,204	$1,430	$2,019,525	0.07%
4855	Charter Bus Industry	978	$1,507,466	$1,541	$2,813,587	0.05%
4859	Other Transit and Ground Passenger Transportation	3,856	$3,185,344	$826	$1,343,491	0.06%
4861	Pipeline Transportation of Crude Oil	70	$347,281	$4,984	$28,045,336	0.02%

Table VIII.D.2. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
4862	Pipeline Transportation of Natural Gas	59	$90,847	$1,528	$15,269,599	0.01%
4869	Other Pipeline Transportation	71	$269,120	$3,788	$22,870,110	0.02%
4871	Scenic and Sightseeing Transportation, Land	572	$1,034,717	$1,808	$1,542,634	0.12%
4872	Scenic and Sightseeing Transportation, Water	1,479	$2,781,692	$1,881	$961,471	0.20%
4879	Scenic and Sightseeing Transportation, Other	229	$354,470	$1,551	$1,442,518	0.11%
4881	Support Activities for Air Transportation	3,639	$7,427,615	$2,041	$2,726,627	0.07%
4882	Support Activities for Rail Transportation	494	$1,414,555	$2,861	$3,694,856	0.08%
4883	Support Activities for Water Transportation	1,852	$6,207,901	$3,353	$4,619,864	0.07%
4884	Support Activities for Road Transportation	9,012	$6,993,625	$776	$1,019,225	0.08%
4885	Freight Transportation Arrangement	12,925	$18,974,056	$1,468	$2,467,206	0.06%
4889	Other Support Activities for Transportation	1,387	$1,669,460	$1,203	$1,765,588	0.07%
4921	Couriers and Express Delivery Services	3,724	$12,926,412	$3,471	$9,170,589	0.04%
4922	Local Messengers and Local Delivery	3,431	$3,012,249	$878	$1,312,866	0.07%
4931	Warehousing and Storage	9,681	$56,004,514	$5,785	$3,692,460	0.16%
5121	Motion Picture and Video Industries	2,568	$7,638,794	$2,975	$1,544,741	0.19%
5122	Sound Recording Industries	466	$946,190	$2,032	$1,914,032	0.11%
5174	Satellite Telecommunications	46	$165,892	$3,602	$3,473,723	0.10%
5182	Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services	1,352	$3,731,170	$2,759	$2,821,642	0.10%
5221	Depository Credit Intermediation	1,562	$21,857,409	$13,995	$15,334,364	0.09%

Table VIII.D.2. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
5222	Nondepository Credit Intermediation	1,085	$3,521,500	$3,245	$2,825,317	0.11%
5223	Activities Related to Credit Intermediation	1,822	$4,068,120	$2,232	$1,274,881	0.18%
5232	Securities and Commodity Exchanges	1	$26,178	$39,745	$753,808,884	0.01%
5239	Other Financial Investment Activities	1,542	$3,322,810	$2,154	$3,014,962	0.07%
5241	Insurance Carriers	724	$7,767,572	$10,729	$64,751,762	0.02%
5242	Agencies, Brokerages, and Other Insurance Related Activities	18,002	$37,871,610	$2,104	$884,543	0.24%
5251	Insurance and Employee Benefit Funds	161	$187,816	$1,164	$860,458	0.14%
5259	Other Investment Pools and Funds	122	$253,899	$2,075	$1,915,830	0.11%
5311	Lessors of Real Estate	13,445	$32,370,835	$2,408	$1,498,519	0.16%
5312	Offices of Real Estate Agents and Brokers	14,553	$27,775,521	$1,909	$848,299	0.22%
5313	Activities Related to Real Estate	10,787	$33,316,314	$3,088	$865,500	0.36%
5321	Automotive Equipment Rental and Leasing	567	$2,987,344	$5,267	$2,647,455	0.20%
5322	Consumer Goods Rental	1,185	$5,301,598	$4,475	$1,093,599	0.41%
5323	General Rental Centers	318	$1,344,257	$4,222	$1,436,198	0.29%
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	1,171	$5,466,318	$4,667	$3,114,198	0.15%
5331	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	315	$671,532	$2,130	$3,900,891	0.05%
5411	Legal Services	23,897	$49,298,948	$2,063	$1,105,731	0.19%
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	15,652	$36,586,403	$2,338	$715,353	0.33%
5413	Architectural, Engineering, and Related Services	12,833	$75,874,312	$5,913	$1,482,804	0.40%
5414	Specialized Design Services	4,402	$11,949,232	$2,715	$783,080	0.35%

Table VIII.D.2. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
5415	Computer Systems Design and Related Services	16,220	$39,798,676	$2,454	$1,363,070	0.18%
5416	Management, Scientific, and Technical Consulting Services	22,491	$62,683,511	$2,787	$917,797	0.30%
5417	Scientific Research and Development Services	2,115	$15,224,604	$7,199	$5,734,418	0.13%
5418	Advertising, Public Relations, and Related Services	4,587	$16,632,694	$3,626	$1,610,062	0.23%
5419	Other Professional, Scientific, and Technical Services	8,774	$45,327,608	$5,166	$1,037,261	0.50%
5511	Management of Companies and Enterprises	932	$7,466,268	$8,009	$7,794,296	0.10%
5611	Office Administrative Services	4,204	$10,143,593	$2,413	$1,807,749	0.13%
5612	Facilities Support Services	296	$3,898,123	$13,148	$4,474,249	0.29%
5613	Employment Services	3,752	$42,559,048	$11,344	$2,963,924	0.38%
5614	Business Support Services	3,342	$5,943,802	$1,778	$1,306,752	0.14%
5615	Travel Arrangement and Reservation Services	1,972	$3,129,421	$1,587	$1,663,607	0.10%
5616	Investigation and Security Services	2,773	$25,002,454	$9,018	$1,245,244	0.72%
5617	Services to Buildings and Dwellings	26,019	$112,901,810	$4,339	$671,194	0.65%
5619	Other Support Services	2,399	$7,136,600	$2,975	$1,533,830	0.19%
5621	Waste Collection	1,078	$2,523,921	$2,342	$3,245,312	0.07%
5622	Waste Treatment and Disposal	181	$743,227	$4,112	$3,879,488	0.11%
5629	Remediation and Other Waste Management Services	1,259	$6,361,525	$5,055	$2,114,365	0.24%
6111	Elementary and Secondary Schools	2,856	$34,194,636	$11,975	$4,338,191	0.28%
6112	Junior Colleges	61	$567,155	$9,272	$7,096,235	0.13%
6113	Colleges, Universities, and Professional Schools	178	$641,408	$3,603	$3,148,365	0.11%

Table VIII.D.2. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
6114	Business Schools and Computer and Management Training	1,150	$2,051,773	$1,785	$1,184,543	0.15%
6115	Technical and Trade Schools	1,020	$3,125,752	$3,063	$1,475,233	0.21%
6116	Other Schools and Instruction	7,124	$15,777,099	$2,215	$471,098	0.47%
6117	Educational Support Services	1,184	$2,055,225	$1,736	$994,278	0.17%
6211	Offices of Physicians	7,538	$16,396,965	$2,175	$1,557,548	0.14%
6212	Offices of Dentists	5,517	$15,448,753	$2,800	$1,107,348	0.25%
6213	Offices of Other Health Practitioners	5,985	$13,236,859	$2,212	$610,067	0.36%
6214	Outpatient Care Centers	799	$6,631,683	$8,303	$3,531,393	0.24%
6215	Medical and Diagnostic Laboratories	326	$1,639,918	$5,023	$2,880,366	0.17%
6216	Home Health Care Services	1,021	$21,196,909	$20,756	$1,947,504	1.07%
6219	Other Ambulatory Health Care Services	290	$2,399,519	$8,280	$2,122,696	0.39%
6221	General Medical and Surgical Hospitals	58	$3,146,213	$54,588	$31,988,544	0.17%
6222	Psychiatric and Substance Abuse Hospitals	10	$1,136,474	$118,967	$26,840,059	0.44%
6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	6	$408,435	$64,547	$24,345,151	0.27%
6231	Nursing Care Facilities (Skilled Nursing Facilities)	377	$15,692,040	$41,623	$7,737,051	0.54%
6232	Residential Intellectual and Developmental Disability, Mental Health, and Substance Abuse Facilities	454	$12,424,041	$27,345	$2,746,969	1.00%
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	779	$13,425,442	$17,232	$2,104,725	0.82%
6239	Other Residential Care Facilities	136	$3,155,732	$23,216	$2,165,006	1.07%
6241	Individual and Family Services	2,496	$39,826,256	$15,956	$1,571,030	1.02%

Table VIII.D.2. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
6242	Community Food and Housing, and Emergency and Other Relief Services	480	$5,254,947	$10,949	$2,633,784	0.42%
6243	Vocational Rehabilitation Services	172	$4,469,310	$25,964	$2,335,393	1.11%
6244	Child Care Services	2,687	$51,565,482	$19,189	$676,561	2.84%
7111	Performing Arts Companies	4,679	$5,483,031	$1,172	$1,560,279	0.08%
7112	Spectator Sports	2,011	$2,409,683	$1,198	$2,328,568	0.05%
7113	Promoters of Performing Arts, Sports, and Similar Events	4,046	$5,398,753	$1,334	$2,099,056	0.06%
7114	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures	2,119	$2,111,109	$996	$1,445,877	0.07%
7115	Independent Artists, Writers, and Performers	15,342	$14,460,165	$942	$835,413	0.11%
7121	Museums, Historical Sites, and Similar Institutions	3,845	$6,836,964	$1,778	$2,394,793	0.07%
7131	Amusement Parks and Arcades	1,742	$3,288,557	$1,888	$1,040,189	0.18%
7132	Gambling Industries	1,000	$2,273,300	$2,272	$5,012,918	0.05%
7139	Other Amusement and Recreation Industries	34,659	$51,264,046	$1,479	$1,051,729	0.14%
7211	Traveler Accommodation	17,375	$32,853,003	$1,891	$2,184,689	0.09%
7212	RV (Recreational Vehicle) Parks and Recreational Camps	2,543	$2,405,045	$946	$991,813	0.10%
7213	Rooming and Boarding Houses, Dormitories, and Workers' Camps	687	$741,076	$1,079	$930,215	0.12%
7223	Special Food Services	7,295	$8,312,585	$1,139	$857,031	0.13%
7224	Drinking Places (Alcoholic Beverages)	14,383	$13,061,680	$908	$663,521	0.14%
7225	Restaurants and Other Eating Places	157,253	$276,972,590	$1,761	$1,144,923	0.15%
8111	Automotive Repair and Maintenance	62,789	$100,273,474	$1,597	$798,630	0.20%

Table VIII.D.2. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
8113	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	8,982	$14,997,313	$1,670	$1,261,858	0.13%
8114	Personal and Household Goods Repair and Maintenance	9,417	$11,449,589	$1,216	$455,661	0.27%
8121	Personal Care Services	52,932	$64,529,881	$1,219	$346,123	0.35%
8122	Death Care Services	6,955	$13,214,986	$1,900	$1,130,650	0.17%
8123	Drycleaning and Laundry Services	13,051	$16,733,433	$1,282	$564,862	0.23%
8129	Other Personal Services	16,792	$22,209,398	$1,323	$509,230	0.26%
8131	Religious Organizations	83,837	$126,171,312	$1,505	$722,894	0.21%
8132	Grantmaking and Giving Services	7,839	$8,889,289	$1,134	$3,473,007	0.03%
8133	Social Advocacy Organizations	6,903	$8,993,435	$1,303	$1,442,084	0.09%
8134	Civic and Social Organizations	11,030	$15,706,906	$1,424	$697,379	0.20%
8139	Business, Professional, Labor, Political, and Similar Organizations	25,710	$33,664,444	$1,309	$1,384,987	0.09%
9993	Local Government	4,846	$132,114,558	$27,261	$17,292,921	0.16%
Total		**1,985,235**	**$3,863,384,856**	**$1,946**	**$2,403,819**	**0.08%**

Source: OSHA estimate.

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
1111	Oilseed and Grain Farming	7,184	$6,027,437	$839	$609,184	0.14%
1112	Vegetable and Melon Farming	1,227	$3,233,900	$2,636	$705,291	0.37%
1113	Fruit and Tree Nut Farming	3,060	$4,119,361	$1,346	$384,931	0.35%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
1114	Greenhouse, Nursery, and Floriculture Production	1,545	$4,149,308	$2,686	$513,448	0.52%
1119	Other Crop Farming	5,537	$6,434,964	$1,162	$198,860	0.58%
1121	Cattle Ranching and Farming	10,474	$11,742,592	$1,121	$523,461	0.21%
1122	Hog and Pig Farming	585	$921,175	$1,575	$2,022,974	0.08%
1123	Poultry and Egg Production	1,356	$2,018,022	$1,488	$2,264,037	0.07%
1124	Sheep and Goat Farming	856	$968,612	$1,131	$59,994	1.89%
1125	Aquaculture	91	$239,911	$2,630	$875,290	0.30%
1129	Other Animal Production	2,806	$3,272,814	$1,166	$88,841	1.31%
1131	Timber Tract Operations	429	$403,940	$942	$1,293,445	0.07%
1132	Forest Nurseries and Gathering of Forest Products	144	$104,419	$725	$679,386	0.11%
1133	Logging	7,530	$6,292,246	$836	$1,170,494	0.07%
1141	Fishing	2,416	$1,100,212	$455	$667,346	0.07%
1142	Hunting and Trapping	331	$292,626	$885	$619,029	0.14%
1151	Support Activities for Crop Production	4,102	$3,213,003	$783	$1,530,220	0.05%
1152	Support Activities for Animal Production	4,531	$2,962,939	$654	$405,439	0.16%
1153	Support Activities for Forestry	1,534	$1,037,673	$676	$765,904	0.09%
2111	Oil and Gas Extraction	4,571	$6,341,178	$1,387	$2,574,156	0.05%
2131	Support Activities for Mining	8,845	$14,462,495	$1,635	$937,066	0.17%
2211	Electric Power Generation, Transmission and Distribution	832	$2,254,730	$2,709	$13,316,386	0.02%
2212	Natural Gas Distribution	267	$546,792	$2,049	$10,690,728	0.02%
2213	Water, Sewage and Other Systems	3,468	$5,937,995	$1,712	$850,747	0.20%
2361	Residential Building Construction	167,394	$90,561,837	$541	$1,043,976	0.05%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
2362	Nonresidential Building Construction	34,810	$32,498,908	$934	$2,948,013	0.03%
2371	Utility System Construction	13,929	$14,564,718	$1,046	$1,657,874	0.06%
2372	Land Subdivision	4,615	$2,626,758	$569	$1,167,179	0.05%
2373	Highway, Street, and Bridge Construction	6,251	$5,486,633	$878	$2,619,746	0.03%
2379	Other Heavy and Civil Engineering Construction	3,581	$3,418,173	$954	$1,444,677	0.07%
2381	Foundation, Structure, and Building Exterior Contractors	83,470	$72,226,262	$865	$936,942	0.09%
2382	Building Equipment Contractors	161,684	$141,354,524	$874	$847,521	0.10%
2383	Building Finishing Contractors	108,028	$74,449,281	$689	$653,438	0.11%
2389	Other Specialty Trade Contractors	62,342	$43,480,559	$697	$1,039,609	0.07%
3111	Animal Food Manufacturing	377	$349,776	$928	$5,316,620	0.02%
3112	Grain and Oilseed Milling	130	$273,983	$2,115	$22,940,721	0.01%
3113	Sugar and Confectionery Product Manufacturing	652	$541,708	$831	$1,163,232	0.07%
3114	Fruit and Vegetable Preserving and Specialty Food Manufacturing	441	$532,718	$1,207	$3,760,308	0.03%
3115	Dairy Product Manufacturing	337	$456,581	$1,353	$9,285,097	0.01%
3116	Animal Slaughtering and Processing	996	$872,620	$876	$2,401,951	0.04%
3117	Seafood Product Preparation and Packaging	129	$107,828	$838	$3,136,053	0.03%
3118	Bakeries and Tortilla Manufacturing	4,379	$4,017,779	$918	$635,675	0.14%
3119	Other Food Manufacturing	1,111	$1,075,034	$968	$2,724,529	0.04%
3121	Beverage Manufacturing	3,429	$2,263,370	$660	$1,398,536	0.05%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3122	Tobacco Manufacturing	32	$42,411	$1,311	$6,587,893	0.02%
3131	Fiber, Yarn, and Thread Mills	60	$75,096	$1,254	$2,191,371	0.06%
3132	Fabric Mills	192	$233,984	$1,217	$3,435,732	0.04%
3133	Textile and Fabric Finishing and Fabric Coating Mills	263	$271,517	$1,031	$1,915,018	0.05%
3141	Textile Furnishings Mills	630	$573,335	$910	$780,741	0.12%
3149	Other Textile Product Mills	1,705	$1,270,778	$745	$614,109	0.12%
3151	Apparel Knitting Mills	54	$66,320	$1,228	$1,443,320	0.09%
3152	Cut and Sew Apparel Manufacturing	2,095	$1,429,596	$682	$637,842	0.11%
3159	Apparel Accessories and Other Apparel Manufacturing	236	$188,102	$796	$619,537	0.13%
3161	Leather and Hide Tanning and Finishing	61	$42,671	$698	$2,839,687	0.02%
3162	Footwear Manufacturing	75	$123,351	$1,655	$2,193,374	0.08%
3169	Other Leather and Allied Product Manufacturing	302	$187,558	$621	$626,299	0.10%
3211	Sawmills and Wood Preservation	1,006	$1,185,132	$1,179	$1,727,380	0.07%
3212	Veneer, Plywood, and Engineered Wood Product Manufacturing	264	$633,617	$2,400	$4,044,768	0.06%
3219	Other Wood Product Manufacturing	3,327	$3,257,167	$979	$1,053,722	0.09%
3221	Pulp, Paper, and Paperboard Mills	27	$376,078	$13,794	$93,208,301	0.01%
3222	Converted Paper Product Manufacturing	559	$893,086	$1,597	$4,579,693	0.03%
3231	Printing and Related Support Activities	10,124	$5,790,603	$572	$693,094	0.08%
3241	Petroleum and Coal Products Manufacturing	244	$494,702	$2,027	$28,484,143	0.01%
3251	Basic Chemical Manufacturing	277	$556,651	$2,011	$21,892,698	0.01%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3252	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	226	$335,765	$1,485	$6,835,167	0.02%
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	229	$350,781	$1,534	$7,269,726	0.02%
3254	Pharmaceutical and Medicine Manufacturing	546	$603,519	$1,106	$3,960,913	0.03%
3255	Paint, Coating, and Adhesive Manufacturing	448	$542,317	$1,211	$3,140,147	0.04%
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing	704	$655,288	$931	$2,390,628	0.04%
3259	Other Chemical Product and Preparation Manufacturing	579	$723,101	$1,250	$3,072,599	0.04%
3261	Plastics Product Manufacturing	2,192	$2,911,100	$1,328	$2,782,966	0.05%
3262	Rubber Product Manufacturing	382	$557,177	$1,459	$2,487,702	0.06%
3271	Clay Product and Refractory Manufacturing	328	$323,850	$989	$1,473,179	0.07%
3272	Glass and Glass Product Manufacturing	539	$546,405	$1,014	$1,791,588	0.06%
3273	Cement and Concrete Product Manufacturing	1,336	$1,655,935	$1,240	$2,456,404	0.05%
3274	Lime and Gypsum Product Manufacturing	51	$122,726	$2,409	$7,351,270	0.03%
3279	Other Nonmetallic Mineral Product Manufacturing	1,006	$1,149,905	$1,143	$1,653,776	0.07%
3311	Iron and Steel Mills and Ferroalloy Manufacturing	103	$218,406	$2,121	$6,567,240	0.03%
3312	Steel Product Manufacturing from Purchased Steel	121	$265,350	$2,191	$7,339,261	0.03%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3313	Alumina and Aluminum Production and Processing	82	$262,328	$3,197	$12,497,676	0.03%
3314	Nonferrous Metal (except Aluminum) Production and Processing	178	$278,430	$1,566	$8,757,990	0.02%
3315	Foundries	391	$547,296	$1,398	$2,192,210	0.06%
3321	Forging and Stamping	556	$557,664	$1,003	$2,020,339	0.05%
3322	Cutlery and Handtool Manufacturing	373	$259,248	$695	$1,107,327	0.06%
3323	Architectural and Structural Metals Manufacturing	4,125	$4,085,887	$991	$1,456,833	0.07%
3324	Boiler, Tank, and Shipping Container Manufacturing	300	$423,339	$1,409	$3,917,337	0.04%
3325	Hardware Manufacturing	186	$153,954	$828	$1,511,537	0.05%
3326	Spring and Wire Product Manufacturing	298	$292,858	$983	$1,589,842	0.06%
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	8,812	$6,785,989	$770	$910,823	0.08%
3328	Coating, Engraving, Heat Treating, and Allied Activities	1,740	$1,753,611	$1,008	$985,271	0.10%
3329	Other Fabricated Metal Product Manufacturing	1,998	$2,026,136	$1,014	$1,910,855	0.05%
3331	Agriculture, Construction, and Mining Machinery Manufacturing	776	$880,986	$1,135	$2,303,225	0.05%
3332	Industrial Machinery Manufacturing	951	$827,287	$870	$1,790,885	0.05%
3333	Commercial and Service Industry Machinery Manufacturing	602	$467,902	$777	$1,741,883	0.04%
3334	Ventilation, Heating, Air-Conditioning, and Commercial	409	$485,787	$1,186	$2,390,594	0.05%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
	Refrigeration Equipment Manufacturing					
3335	Metalworking Machinery Manufacturing	2,174	$1,503,816	$692	$1,172,111	0.06%
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	186	$279,911	$1,504	$4,514,698	0.03%
3339	Other General Purpose Machinery Manufacturing	1,576	$1,782,884	$1,131	$2,828,012	0.04%
3341	Computer and Peripheral Equipment Manufacturing	317	$181,009	$570	$2,040,422	0.03%
3342	Communications Equipment Manufacturing	374	$275,245	$735	$2,213,015	0.03%
3343	Audio and Video Equipment Manufacturing	180	$98,831	$548	$1,509,740	0.04%
3344	Semiconductor and Other Electronic Component Manufacturing	991	$740,401	$747	$1,810,399	0.04%
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	1,411	$961,637	$682	$2,280,952	0.03%
3346	Manufacturing and Reproducing Magnetic and Optical Media	158	$80,247	$509	$869,333	0.06%
3351	Electric Lighting Equipment Manufacturing	321	$290,904	$906	$2,228,223	0.04%
3352	Household Appliance Manufacturing	73	$67,216	$915	$1,907,392	0.05%
3353	Electrical Equipment Manufacturing	543	$585,477	$1,078	$2,265,967	0.05%
3359	Other Electrical Equipment and Component Manufacturing	530	$775,438	$1,462	$4,923,782	0.03%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3361	Motor Vehicle Manufacturing	72	$42,019	$586	$8,079,095	0.01%
3362	Motor Vehicle Body and Trailer Manufacturing	462	$571,401	$1,237	$2,128,388	0.06%
3363	Motor Vehicle Parts Manufacturing	1,140	$1,248,555	$1,096	$2,450,442	0.04%
3364	Aerospace Product and Parts Manufacturing	368	$569,759	$1,550	$4,750,992	0.03%
3365	Railroad Rolling Stock Manufacturing	32	$104,712	$3,303	$12,137,746	0.03%
3366	Ship and Boat Building	446	$605,519	$1,357	$1,347,324	0.10%
3369	Other Transportation Equipment Manufacturing	321	$258,348	$804	$1,487,253	0.05%
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	4,244	$3,437,887	$810	$718,130	0.11%
3372	Office Furniture (including Fixtures) Manufacturing	1,162	$1,046,524	$901	$1,149,394	0.08%
3379	Other Furniture Related Product Manufacturing	216	$288,388	$1,337	$2,340,433	0.06%
3391	Medical Equipment and Supplies Manufacturing	3,950	$2,735,349	$693	$758,887	0.09%
3399	Other Miscellaneous Manufacturing	7,399	$5,215,239	$705	$801,390	0.09%
4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	1,257	$4,993,354	$3,973	$3,303,747	0.12%
4232	Furniture and Home Furnishing Merchant Wholesalers	910	$3,110,498	$3,417	$2,854,446	0.12%
4233	Lumber and Other Construction Materials Merchant Wholesalers	785	$2,505,110	$3,193	$3,557,039	0.09%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	1,916	$5,577,568	$2,912	$2,405,983	0.12%
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	556	$2,106,984	$3,790	$6,228,340	0.06%
4236	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers	1,576	$5,580,492	$3,542	$3,369,434	0.11%
4237	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers	816	$2,636,524	$3,230	$2,796,763	0.12%
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	3,312	$15,267,247	$4,610	$2,896,468	0.16%
4239	Miscellaneous Durable Goods Merchant Wholesalers	2,551	$6,358,104	$2,492	$2,832,277	0.09%
4241	Paper and Paper Product Merchant Wholesalers	610	$2,004,758	$3,287	$2,995,604	0.11%
4242	Drugs and Druggists' Sundries Merchant Wholesalers	563	$1,888,913	$3,356	$4,020,123	0.08%
4243	Apparel, Piece Goods, and Notions Merchant Wholesalers	1,248	$3,098,845	$2,483	$2,808,295	0.09%
4244	Grocery and Related Product Merchant Wholesalers	2,242	$7,359,247	$3,283	$4,893,717	0.07%
4245	Farm Product Raw Material Merchant Wholesalers	266	$1,240,969	$4,671	$11,316,686	0.04%
4246	Chemical and Allied Products Merchant Wholesalers	676	$2,375,082	$3,516	$5,030,093	0.07%
4247	Petroleum and Petroleum Products Merchant Wholesalers	263	$1,242,062	$4,718	$20,772,751	0.02%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
4248	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	243	$763,626	$3,147	$3,176,806	0.10%
4249	Miscellaneous Nondurable Goods Merchant Wholesalers	1,870	$6,010,140	$3,215	$2,900,974	0.11%
4251	Wholesale Trade Agents and Brokers	3,577	$7,395,194	$2,068	$8,758,811	0.02%
4411	Automobile Dealers	4,702	$9,420,631	$2,004	$3,255,236	0.06%
4412	Other Motor Vehicle Dealers	1,853	$4,518,777	$2,439	$2,697,277	0.09%
4413	Automotive Parts, Accessories, and Tire Retailers	4,859	$11,159,040	$2,297	$1,134,410	0.20%
4441	Building Material and Supplies Dealers	5,693	$7,059,545	$1,240	$1,614,974	0.08%
4442	Lawn and Garden Equipment and Supplies Retailers	2,502	$5,016,485	$2,005	$1,498,082	0.13%
4451	Grocery and Convenience Retailers	10,521	$16,794,972	$1,596	$1,054,320	0.15%
4452	Specialty Food Retailers	3,551	$5,729,397	$1,613	$900,891	0.18%
4453	Beer, Wine, and Liquor Retailers	5,163	$5,975,343	$1,157	$1,325,671	0.09%
4491	Furniture and Home Furnishings Retailers	6,010	$8,962,736	$1,491	$1,223,523	0.12%
4492	Electronics and Appliance Retailers	3,217	$4,908,069	$1,525	$1,030,417	0.15%
4551	Department Stores	148	$190,770	$1,287	$1,621,586	0.08%
4552	Warehouse Clubs, Supercenters, and Other General Merchandise Retailers	2,556	$3,419,681	$1,338	$842,471	0.16%
4561	Health and Personal Care Retailers	7,776	$9,533,570	$1,226	$1,791,759	0.07%
4571	Gasoline Stations	10,327	$15,498,593	$1,501	$2,804,858	0.05%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
4572	Fuel Dealers	649	$1,060,755	$1,635	$2,693,189	0.06%
4581	Clothing and Clothing Accessories Retailers	5,967	$8,712,135	$1,460	$698,207	0.21%
4582	Shoe Retailers	1,010	$1,421,801	$1,408	$1,020,151	0.14%
4583	Jewelry, Luggage, and Leather Goods Retailers	2,976	$3,898,966	$1,310	$1,079,268	0.12%
4591	Sporting Goods, Hobby, and Musical Instrument Retailers	5,150	$7,074,290	$1,374	$864,136	0.16%
4592	Book Retailers and News Dealers	774	$988,633	$1,278	$744,295	0.17%
4593	Florists	2,213	$3,540,277	$1,600	$494,498	0.32%
4594	Office Supplies, Stationery, and Gift Retailers	3,317	$4,621,207	$1,393	$627,443	0.22%
4595	Used Merchandise Retailers	2,352	$3,240,613	$1,378	$608,402	0.23%
4599	Other Miscellaneous Retailers	5,911	$8,732,908	$1,477	$1,042,423	0.14%
4811	Scheduled Air Transportation	278	$293,355	$1,054	$3,080,504	0.03%
4812	Nonscheduled Air Transportation	1,285	$1,286,819	$1,001	$2,040,509	0.05%
4821	Rail Transportation	96	$51,361	$536	$399,619	0.13%
4831	Deep Sea, Coastal, and Great Lakes Water Transportation	455	$544,184	$1,196	$2,200,414	0.05%
4832	Inland Water Transportation	323	$453,643	$1,403	$1,350,810	0.10%
4841	General Freight Trucking	51,643	$37,499,799	$726	$861,013	0.08%
4842	Specialized Freight Trucking	35,020	$26,650,522	$761	$892,912	0.09%
4851	Urban Transit Systems	373	$312,637	$839	$839,880	0.10%
4852	Interurban and Rural Bus Transportation	332	$422,567	$1,274	$833,268	0.15%
4853	Taxi and Limousine Service	5,931	$6,596,898	$1,112	$473,725	0.23%
4854	School and Employee Bus Transportation	1,444	$1,578,496	$1,093	$381,438	0.29%
4855	Charter Bus Industry	663	$764,143	$1,152	$976,121	0.12%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
4859	Other Transit and Ground Passenger Transportation	3,097	$2,381,262	$769	$514,988	0.15%
4861	Pipeline Transportation of Crude Oil	27	$34,499	$1,282	$5,687,521	0.02%
4862	Pipeline Transportation of Natural Gas	59	$90,847	$1,528	$15,269,599	0.01%
4869	Other Pipeline Transportation	29	$37,586	$1,288	$4,867,763	0.03%
4871	Scenic and Sightseeing Transportation, Land	474	$570,363	$1,203	$670,486	0.18%
4872	Scenic and Sightseeing Transportation, Water	1,385	$2,109,958	$1,524	$589,761	0.26%
4879	Scenic and Sightseeing Transportation, Other	208	$272,900	$1,311	$812,572	0.16%
4881	Support Activities for Air Transportation	2,961	$3,481,748	$1,176	$1,058,641	0.11%
4882	Support Activities for Rail Transportation	315	$430,553	$1,366	$1,603,240	0.09%
4883	Support Activities for Water Transportation	1,396	$1,914,888	$1,372	$1,256,551	0.11%
4884	Support Activities for Road Transportation	8,222	$6,121,945	$745	$687,092	0.11%
4885	Freight Transportation Arrangement	11,283	$15,674,157	$1,389	$1,583,872	0.09%
4889	Other Support Activities for Transportation	1,202	$1,095,829	$912	$799,155	0.11%
4921	Couriers and Express Delivery Services	3,125	$2,811,195	$900	$843,986	0.11%
4922	Local Messengers and Local Delivery	2,990	$2,455,403	$821	$741,162	0.11%
4931	Warehousing and Storage	3,555	$3,599,514	$1,012	$1,301,304	0.08%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
5121	Motion Picture and Video Industries	2,383	$4,673,631	$1,962	$903,851	0.22%
5122	Sound Recording Industries	445	$780,716	$1,754	$660,025	0.27%
5131	Newspaper, Periodical, Book, and Directory Publishers	1,936	$4,503,697	$2,326	$816,692	0.28%
5132	Software Publishers	1,057	$2,023,518	$1,915	$1,268,517	0.15%
5161	Radio and Television Broadcasting Stations	370	$1,470,235	$3,969	$662,207	0.60%
5162	Media Streaming Distribution Services, Social Networks, and Other Media Networks and Content Providers	235	$560,991	$2,388	$1,346,479	0.18%
5171	Wired and Wireless Telecommunications (except Satellite)	942	$1,900,994	$2,018	$1,249,302	0.16%
5174	Satellite Telecommunications	40	$86,847	$2,157	$1,745,466	0.12%
5178	All Other Telecommunications	287	$502,736	$1,753	$1,126,736	0.16%
5182	Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services	1,112	$2,196,650	$1,976	$1,171,961	0.17%
5192	Web Search Portals, Libraries, Archives, and Other Information Services	468	$867,704	$1,853	$507,510	0.37%
5221	Depository Credit Intermediation	637	$1,709,643	$2,682	$1,711,700	0.16%
5222	Nondepository Credit Intermediation	1,654	$3,919,691	$2,369	$1,191,143	0.20%
5223	Activities Related to Credit Intermediation	1,718	$3,212,716	$1,870	$758,941	0.25%
5231	Securities and Commodity Contracts Intermediation and Brokerage	1,349	$2,298,865	$1,704	$1,235,568	0.14%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
5232	Securities and Commodity Exchanges	0	$19,633	$39,745	$753,808,884	0.01%
5239	Other Financial Investment Activities	6,852	$11,878,438	$1,734	$1,247,480	0.14%
5241	Insurance Carriers	499	$1,011,256	$2,025	$3,600,269	0.06%
5242	Agencies, Brokerages, and Other Insurance Related Activities	17,366	$34,184,872	$1,968	$575,155	0.34%
5251	Insurance and Employee Benefit Funds	197	$166,858	$849	$198,788	0.43%
5259	Other Investment Pools and Funds	112	$200,679	$1,786	$1,085,641	0.16%
5311	Lessors of Real Estate	12,961	$26,616,095	$2,054	$1,090,656	0.19%
5312	Offices of Real Estate Agents and Brokers	14,379	$25,261,103	$1,757	$700,221	0.25%
5313	Activities Related to Real Estate	10,077	$22,407,861	$2,224	$584,901	0.38%
5321	Automotive Equipment Rental and Leasing	482	$1,447,641	$3,004	$1,018,247	0.29%
5322	Consumer Goods Rental	1,039	$3,003,692	$2,891	$609,218	0.47%
5323	General Rental Centers	284	$865,973	$3,049	$969,539	0.31%
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	949	$2,282,588	$2,404	$1,447,107	0.17%
5331	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	285	$476,238	$1,669	$3,054,162	0.05%
5411	Legal Services	22,852	$45,807,442	$2,005	$747,237	0.27%
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	14,754	$29,735,652	$2,015	$425,212	0.47%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
5413	Architectural, Engineering, and Related Services	11,568	$42,680,149	$3,690	$796,165	0.46%
5414	Specialized Design Services	4,322	$10,844,535	$2,509	$651,156	0.39%
5415	Computer Systems Design and Related Services	15,074	$30,869,789	$2,048	$699,158	0.29%
5416	Management, Scientific, and Technical Consulting Services	21,484	$48,439,074	$2,255	$605,529	0.37%
5417	Scientific Research and Development Services	1,662	$4,503,806	$2,709	$1,184,901	0.23%
5418	Advertising, Public Relations, and Related Services	4,240	$11,597,282	$2,735	$972,915	0.28%
5419	Other Professional, Scientific, and Technical Services	8,042	$31,055,715	$3,862	$718,191	0.54%
5511	Management of Companies and Enterprises	622	$1,694,619	$2,724	$2,000,475	0.14%
5611	Office Administrative Services	3,518	$5,423,804	$1,542	$785,494	0.20%
5612	Facilities Support Services	157	$441,128	$2,817	$1,344,810	0.21%
5613	Employment Services	2,522	$4,435,122	$1,758	$862,254	0.20%
5614	Business Support Services	2,939	$3,932,901	$1,338	$637,724	0.21%
5615	Travel Arrangement and Reservation Services	1,846	$2,452,247	$1,328	$1,145,290	0.12%
5616	Investigation and Security Services	2,305	$7,402,537	$3,212	$568,222	0.57%
5617	Services to Buildings and Dwellings	24,202	$62,022,534	$2,563	$441,221	0.58%
5619	Other Support Services	2,194	$4,403,819	$2,007	$960,942	0.21%
5621	Waste Collection	893	$1,162,660	$1,301	$1,262,504	0.10%
5622	Waste Treatment and Disposal	140	$316,092	$2,251	$1,725,940	0.13%
5629	Remediation and Other Waste Management Services	1,086	$3,133,580	$2,885	$1,098,195	0.26%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
6111	Elementary and Secondary Schools	1,169	$3,475,761	$2,973	$637,302	0.47%
6112	Junior Colleges	29	$111,992	$3,817	$2,336,262	0.16%
6113	Colleges, Universities, and Professional Schools	119	$231,971	$1,952	$1,512,355	0.13%
6114	Business Schools and Computer and Management Training	1,062	$1,591,435	$1,498	$755,854	0.20%
6115	Technical and Trade Schools	841	$1,646,426	$1,959	$687,422	0.28%
6116	Other Schools and Instruction	6,476	$11,488,813	$1,774	$332,175	0.53%
6117	Educational Support Services	1,096	$1,574,151	$1,437	$604,768	0.24%
6211	Offices of Physicians	6,908	$12,269,746	$1,776	$960,870	0.18%
6212	Offices of Dentists	5,290	$13,513,854	$2,555	$948,924	0.27%
6213	Offices of Other Health Practitioners	5,695	$10,110,019	$1,775	$447,256	0.40%
6214	Outpatient Care Centers	536	$1,544,461	$2,879	$989,325	0.29%
6215	Medical and Diagnostic Laboratories	265	$717,035	$2,703	$1,182,302	0.23%
6216	Home Health Care Services	653	$2,917,046	$4,468	$518,702	0.86%
6219	Other Ambulatory Health Care Services	209	$655,184	$3,137	$797,038	0.39%
6221	General Medical and Surgical Hospitals	4	$20,164	$5,297	$10,704,238	0.05%
6222	Psychiatric and Substance Abuse Hospitals	1	$60,072	$40,967	$15,140,669	0.27%
6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	2	$89,129	$45,058	$23,112,360	0.19%
6231	Nursing Care Facilities (Skilled Nursing Facilities)	97	$299,181	$3,092	$1,138,055	0.27%
6232	Residential Intellectual and Developmental Disability, Mental	246	$1,184,615	$4,820	$495,389	0.97%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
	Health, and Substance Abuse Facilities					
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	523	$2,224,552	$4,252	$439,078	0.97%
6239	Other Residential Care Facilities	83	$513,007	$6,216	$469,247	1.32%
6241	Individual and Family Services	1,805	$7,386,994	$4,092	$424,361	0.96%
6242	Community Food and Housing, and Emergency and Other Relief Services	334	$1,555,480	$4,659	$990,632	0.47%
6243	Vocational Rehabilitation Services	81	$345,131	$4,262	$566,673	0.75%
6244	Child Care Services	2,132	$20,144,880	$9,448	$290,434	3.25%
7111	Performing Arts Companies	4,171	$4,129,821	$990	$787,860	0.13%
7112	Spectator Sports	1,794	$1,430,879	$797	$1,258,295	0.06%
7113	Promoters of Performing Arts, Sports, and Similar Events	3,604	$3,665,186	$1,017	$1,122,492	0.09%
7114	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures	2,047	$2,033,576	$993	$1,093,566	0.09%
7115	Independent Artists, Writers, and Performers	15,202	$14,251,524	$937	$787,943	0.12%
7121	Museums, Historical Sites, and Similar Institutions	3,149	$3,311,160	$1,051	$608,424	0.17%
7131	Amusement Parks and Arcades	1,354	$1,316,414	$972	$516,918	0.19%
7132	Gambling Industries	744	$922,020	$1,239	$1,354,532	0.09%
7139	Other Amusement and Recreation Industries	28,297	$22,821,999	$807	$483,584	0.17%
7211	Traveler Accommodation	12,993	$15,574,139	$1,199	$877,297	0.14%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
7212	RV (Recreational Vehicle) Parks and Recreational Camps	2,293	$1,620,981	$707	$721,900	0.10%
7213	Rooming and Boarding Houses, Dormitories, and Workers' Camps	654	$651,616	$996	$650,782	0.15%
7223	Special Food Services	6,293	$4,826,527	$767	$453,753	0.17%
7224	Drinking Places (Alcoholic Beverages)	12,801	$9,231,321	$721	$450,393	0.16%
7225	Restaurants and Other Eating Places	117,267	$109,738,307	$936	$537,890	0.17%
8111	Automotive Repair and Maintenance	64,015	$85,582,777	$1,337	$646,006	0.21%
8112	Electronic and Precision Equipment Repair and Maintenance	4,843	$7,081,340	$1,462	$555,490	0.26%
8113	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	8,375	$11,158,572	$1,332	$842,857	0.16%
8114	Personal and Household Goods Repair and Maintenance	9,205	$10,159,719	$1,104	$380,439	0.29%
8121	Personal Care Services	50,363	$59,103,771	$1,174	$267,441	0.44%
8122	Death Care Services	6,418	$9,445,610	$1,472	$854,725	0.17%
8123	Drycleaning and Laundry Services	12,190	$12,520,561	$1,027	$353,835	0.29%
8129	Other Personal Services	15,818	$15,920,372	$1,006	$339,338	0.30%
8131	Religious Organizations	76,718	$98,017,873	$1,278	$417,227	0.31%
8132	Grantmaking and Giving Services	7,573	$8,483,782	$1,120	$2,705,446	0.04%
8133	Social Advocacy Organizations	6,199	$6,958,994	$1,123	$816,788	0.14%
8134	Civic and Social Organizations	10,249	$12,512,391	$1,221	$479,271	0.25%

Table VIII.D.3. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
8139	Business, Professional, Labor, Political, and Similar Organizations	23,841	$28,061,383	$1,177	$819,457	0.14%
9993	Local Government	1,922	$4,052,837	$2,109	$1,111,959	0.19%
Total		**1,847,745**	**$2,177,399,776**	**$1,178**	**$987,455**	**0.12%**

Source: OSHA estimate.

E. Benefits.

I. Introduction.

OSHA's proposed standard for Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings is a crucial step towards ensuring the health, safety, and well-being of employees with occupational exposure to hazardous heat. Compliance with this standard is projected to yield substantial health and safety benefits, primarily through the reduction of occupational non-fatal heat-related injuries and illnesses (HRIs) and heat-related fatalities. These include severe conditions such as heat stroke, which can be fatal if not promptly treated, and heat exhaustion, which can lead to more serious complications if ignored. To estimate the health and safety benefits of this standard, OSHA has conducted an analysis of data on workplace incidents involving exposure to heat. In this section, OSHA will first present the available BLS data on HRIs and heat-related fatalities. After that, there is a discussion of underreporting issues surrounding these data which leads to a presentation of OSHA's underreporting adjusted count of HRIs and heat-related fatalities. Even with this adjustment, there remains a great deal of uncertainty surrounding the extent of underreporting, other parameters used in this estimation of health and safety benefits, as well as additional potential benefits, all of which the agency discusses next in an uncertainty analysis. Finally, this section includes a sensitivity analysis that calculates the potential benefits of this standard assuming different parameters to demonstrate the range of potential quantifiable benefits.

II. Fatal and Non-Fatal Heat-Related Injuries and Illnesses.

OSHA estimated the potential benefits of the proposed standard by determining the number of HRIs and heat-related fatalities that could be prevented through its provisions. This estimation was based on data regarding occupational fatalities and HRIs resulting from exposure to environmental heat. OSHA conducted this analysis using data from the BLS Injuries, Illnesses, and Fatalities (IIF) program. The IIF program collects data annually through two major surveys: the Census of Fatal Occupational Injuries (CFOI) and the Survey of Occupational Injuries and Illnesses (SOII). OSHA identified the number of heat-related fatalities and HRIs by searching BLS' CFOI and SOII databases for incidents captured under BLS event or exposure classification code 531 – Exposure to Environmental Heat.

A. Heat-Related Fatalities.

The CFOI, a Federal/State cooperative program, aims to provide accurate, comprehensive, and timely information on occupational fatalities. According to the CFOI data, between 1992 and 2022, there were 1,042 fatal cases due to employee exposure to environmental heat (BLS, 2024c). As depicted in Table VIII.E.1., while the annual number of heat-related fatalities has fluctuated over this 31-year period, a gradual increasing trend in the annual average is evident.

Table VIII.E.1. Occupational Fatalities: Exposure to Environmental Heat, All Ownerships, U.S., 1992-2022

Year	Number of Fatalities
1992	12
1993	22
1994	28
1995	35
1996	18
1997	22
1998	34
1999	35
2000	21
2001	24
2002	40
2003	29
2004	18
2005	47
2006	44
2007	32
2008	27
2009	35
2010	40
2011	61
2012	31
2013	34
2014	18
2015	37
2016	39
2017	32
2018	49
2019	43
2020	56
2021	36
2022	43
Total Fatalities	**1,042**

Source: BLS, 2024c.

To assess recent trends, OSHA focused its analysis on heat-related fatalities between 2011 and 2022. Over this 12-year timeframe, BLS CFOI data reported a total of 479 work-related fatalities from exposure to environmental heat, an average of 40 fatalities per year. OSHA also evaluated the fatality counts by industry. Due to BLS publication guidelines, some industry-level estimates were not publishable, denoted by dashes in the BLS tables. OSHA used the BLS data to estimate the number of fatalities by industry for those cases. OSHA used four steps to estimate the number of industry fatalities in years with undisclosed BLS data.

First, OSHA reviewed the total annual number of heat-related fatalities in all industries, comparing this total to the sum of annual total fatalities in private industry and government. In all cases where the sum of the fatalities in the two categories did not match the total annual fatalities, one of the categories had an undisclosed annual fatality count. Therefore, OSHA assumed that the fatality count for the undisclosed estimate was equal to the difference between total annual fatalities and the fatalities in the published estimate (total for private industry or government). For example, in 2020, the total number of fatalities in all industries was 56, the total number of fatalities in private industry was 52, and the total in government was undisclosed. OSHA estimated that the number of heat-related fatalities in government was equal to the difference, four.

Second, OSHA reviewed the total heat-related deaths in all private industry and compared to the sum of heat-related fatalities in private goods-producing industries and private service-producing industries combined. Since these two groups cover all private industry, the numbers are expected to be equal. In 2019–2022, the data for both categories (goods-producing and service-providing) was undisclosed. OSHA estimated the number of fatalities for both categories for 2019–2022. Using the data from 2011–2018, OSHA divided the average percentage of heat-related private industry fatalities that were attributable to each group, estimating that 63 percent of private industry fatalities were in goods-producing industries and the remaining 37 percent were in service-producing industries. In each of the four years with undisclosed data, OSHA estimated the total fatalities in goods-producing and service-providing industries by multiplying each percentage by the total number of private industry annual heat-related fatalities. For example, in 2019, OSHA estimates that 63 percent of the private industry fatalities, 25.3 fatalities, are in goods-producing industries.

Next, OSHA reviewed the super-sectors within private goods-producing and private service-providing industries, comparing the total annual fatalities in each category to the sum of the annual fatalities of the lower, more detailed underlying super-sectors.[96] In years where the comparison showed a mismatch due to undisclosed data, OSHA estimated the data for the undisclosed super-sectors by distributing the difference between the total annual fatalities and the sum of fatalities in the underlying super-sectors across the super-sectors with undisclosed data. More specifically, the estimate for these undisclosed super-sectors was set equal to the difference described above multiplied by the percentage of non-fatal heat-related incidents[97] by super-sector. This percentage is calculated by the estimate of average annual heat-related non-fatal injuries and illnesses within the super-sector divided by the average total number of heat-related incidents in the category in which it belongs (i.e., goods-producing or service-providing).

[96] The underlying super-sectors of Goods-Producing Industries are Natural Resources and Mining (includes agriculture), Construction, and Manufacturing. The underlying super-sectors within Service-Providing industries are Trade, Transportation, and Utilities; Information; Financial Activities; Professional and Business Services; Education and Health Services; Leisure and Hospitality; and Other Services.

[97] The percentage of total domain-level non-fatal heat-related incidents by super-sector was calculated using the SOII data from 2011–2022, described in more detail in Section VIII.E.II.B., below.

Finally, OSHA examined the annual fatality counts for government and used a different method to estimate fatalities due to the differences in scope between SOII and CFOI.[98] For each year, OSHA calculated the difference between the total annual heat-related fatalities in government and the sum of annual fatality counts by all government ownership types (federal, state, and local). OSHA assumed this difference represents the number of fatalities for ownership types with undisclosed yearly estimates. OSHA evenly distributed the difference across all government ownerships with undisclosed estimates for that year. For example, in 2020 there were four total heat-related fatalities in all government. Since none of the government ownership types had disclosed estimates, OSHA estimated that local, state, and federal government had 1.3 (4/3) fatalities each. Table VIII.E.2. presents the total estimated fatality counts for 2011 to 2022 by industry groups.

Further analysis of the data revealed that an estimated 88.1 percent or 422 of these fatalities occurred within private industry, while 11.9 percent or 57 fatalities were recorded in federal, state, and local governments. Within the private industry, the Goods Producing industries accounted for 262 of these estimated fatalities, with Construction accounting for 162 of the incidents within that sector. Natural Resources and Mining (which includes agriculture) and Manufacturing accounted for 52 and 49 of the estimated fatalities within the Goods-Producing industries respectively. Additionally, 160 of the 422 fatalities in private industry occurred in the Service-Providing industries, which includes super-sectors such as Trade, Transportation and Utilities, Leisure and

[98] SOII excludes federal government ownership and CFOI does not.

Hospitality, and Professional and Business Services. Professional and Business Services (this NAICS super-sector can include disparate occupations, including janitors, material movers, groundskeeping workers, office clerks, security guards, architects, accountants, engineers, general managers, waste collectors, and lawyers) made up nearly 45 percent of all fatalities within the Service Providing industries, accounting for 71 of the 160 fatalities within this group. These findings are detailed below in Table VIII.E.2., illustrating the distribution of fatalities across different sectors and industries.

Table VIII.E.2. Estimated Occupational Fatalities by Industry: Exposure to Environmental Heat, Number and Percent, All Ownerships, U.S., 2011-2022

Industry	**Estimated Total Number of Fatalities**	**Percent of Total Fatalities**
Total Injuries Fatalities	**479**	
Private Industry [a]	422	88.1
Goods Producing Industries[b][c]	262	54.8
Natural Resources and Mining	52	10.8
Construction	162	33.7
Manufacturing	49	10.3
Service Providing Industries [b][c]	160	33.3
Trade, Transportation and Utilities	45	9.4
Information	7	1.4
Financial Activities	5	1.0
Professional and Business Services	71	14.8
Education and Health Services	7	1.4
Leisure and Hospitality	15	3.2
Other Services	10	2.0
Government [a][d]	57	11.9

Federal Government	26	5.5
State Government	10	2.1
Local Government	21	4.3

Source: OSHA derived estimates based on BLS, 2024c.
[a] OSHA estimated years with undisclosed data using the difference between total annual fatalities and the sum of private industry and government fatalities.
[b] OSHA estimated years with undisclosed estimates for goods-producing industry totals and service-providing industry totals by comparing the annual sum of both categories to the total annual private industry fatalities and adjusting for the average percentage of private industries that fall within each category.
[c] For years with undisclosed data in the underlying super-sectors within these categories, OSHA estimated the number of fatalities by multiplying the number of fatalities unaccounted for in the published data by a ratio of the non-fatal heat-related injuries and illnesses for the super-sector
[d] Estimates for the three different government ownership codes with annual undisclosed data were estimated by distributing the residual between the total annual government fatalities and the sum of published fatalities at the more detailed government ownership level, evenly across all government ownership types with undisclosed estimates.

B. Non-Fatal Heat-Related Injuries and Illnesses (HRIs).

The BLS SOII is a Federal/State cooperative program that publishes estimates on non-fatal occupational injuries and illnesses, including HRIs. From 2011 to 2022, SOII recorded a total of 39,450 HRIs that required days away from work, averaging 3,288 HRIs per year (BLS, 2023b; BLS, 2023g; and BLS, 2023h). As detailed in Table VIII.E.3., 35.8 percent of these HRIs required only one day away from work to recover after the incident, 21.5 percent required two days, and 23.9 percent needed three to five days. The remaining 18.8 percent of cases needed six or more days away from work for recovery from injuries and illnesses caused by exposure to environmental heat.

Table VIII.E.3. Non-Fatal Occupational Injuries and Illnesses Requiring Days Away From Work: Exposure to Environmental Heat, Number and Percent, All Ownerships, U.S., 2011 - 2022

	Number of Non-Fatal Injuries and Illnesses	**Percent of Total Non-Fatal Injuries and Illnesses**
Total Non-Fatal Injuries and Illnesses:	**39,450**	
Number of days away from work:		
Cases involving 1 day	14,130	35.8
Cases involving 2 days	8,500	21.5
Cases involving 3-5 days	9,440	23.9
Cases involving 6-10 days	3,660	9.3
Cases involving 11-20 days	1,760	4.5
Cases involving 21-30 days	480	1.2
Cases involving 31 or more days	1,500	3.8
Median days away from work [a]	2	

Source: OSHA calculations based on BLS, 2023b; BLS, 2023g; and BLS, 2023h.
Note: Because of rounding and data exclusion of nonclassifiable responses, data may not sum to the totals. Days away from work include those that result in days away from work with or without job transfer or restriction.
[a] Median days away from work is the measure used to summarize the varying lengths of absences from work among the cases with days away from work. Half the cases involved more days and half involved less days than a specified median. Median days away from work are represented in actual values.

Table VIII.E.4. details the BLS' SOII estimates of annual incidence rates of HRIs between 2011 and 2022. Over this period, the average estimated annual incidence rate is 3 cases per 100,000 full-time workers for HRIs. This incidence rate indicates the annual frequency of injuries and illnesses due to heat exposure.

Table VIII.E.4. Non-Fatal Occupational Injuries or Illnesses: Exposure to Environmental Heat, Number and Annual Incidence Rates per 100,000 workers, All Ownerships, U.S., 2011-2022

Year	Number of Non-Fatal Injuries or Illnesses	Incidence Rate Per 100,000 Full-Time Workers
2011	4,420	4
2012	4,170	4
2013	3,160	3
2014	2,660	2
2015	2,830	3
2016	4,110	4
2017	3,180	3
2018	3,950	3
2019	3,080	3
2020	2,330	2
2021 & 2022	5,560	2
Total Non-Fatal Injuries and Illnesses, All Ownerships	**39,450**	
Average Non-Fatal Injuries and Illnesses Per Year	**3,288**	**3**

Source: BLS, 2023b; BLS, 2023g; and BLS, 2023h.

Note: Starting with 2021, BLS published data biennially. The number of HRIs reported for 2021 and 2022, is a biennial estimate.

Table VIII.E.5. presents the number of HRIs by industry from 2011 to 2022. Similar to the findings illustrated in Table VIII.E.2., Table VIII.E.5. demonstrates that the majority of HRIs also occur predominantly within private industry, accounting for 79.9 percent or 31,510 of the 39,450 non-fatal injuries and illnesses. Twenty-one percent of HRIs occurred within state and local governments, accounting for 7,930 of all HRIs. Within private industry, more than half of all recorded HRIs occurred in the Service Providing sector, which accounted for 18,460 of the total 31,510 HRIs recorded. The

Trade, Transportation, and Utilities industry (which includes Wholesale Trade, Retail Trade, Transportation and Warehousing, and Utilities) made up 8,010 of HRIs within the Service Providing sector, followed by Professional and Business Services, and Leisure and Hospitality with 4,260, and 1,790 HRIs, respectively. The Goods Producing sector accounted for 13,050 of the total HRIs within private industry, most of which occurred within the Construction and Manufacturing industries, with 6,130 and 5,100 non-fatal cases respectively.

Table VIII.E.5. Non-Fatal Occupational Injuries and Illnesses by Industry: Exposure to Environmental Heat, Number and Percent, All Ownerships, U.S., 2011-2022

Industry	**Number of Injuries and Illnesses**	**Percent of Total Injuries and Illnesses**
Total Injuries and Illnesses	**39,450**	
Private Industry	**31,510**	**79.9**
Goods Producing Industries	13,050	33.1
Natural Resources and Mining	1,790	4.5
Agriculture, Forestry, Fishing and Hunting	1,200	3.0
Mining	580	1.5
Construction	6,130	15.5
Manufacturing	5,100	12.9
Service Providing Industries	18,460	46.8
Trade, Transportation and Utilities	8,010	20.3
Wholesale Trade	1,570	4.0
Retail Trade	2,200	5.6
Transportation and Warehousing	3,900	9.9
Utilities	330	0.8
Information	1,140	2.9
Financial Activities	810	2.1
Finance and Insurance	-	-

Table VIII.E.5. Non-Fatal Occupational Injuries and Illnesses by Industry: Exposure to Environmental Heat, Number and Percent, All Ownerships, U.S., 2011-2022

Industry	Number of Injuries and Illnesses	Percent of Total Injuries and Illnesses
Real Estate and Rental and Leasing	680	1.7
Professional and Business Services	4,260	10.8
Professional, Scientific, and Technical Services	120	0.3
Management of Companies and Enterprises	60	0.2
Administrative and support and waste management and remediation services	3,520	8.9
Education and Health Services	1,140	2.9
Educational Services	110	0.3
Healthcare and Social Assistance	1,000	2.5
Leisure and Hospitality	1,790	4.5
Arts, Entertainment, and Recreation	540	1.4
Accommodation and Food Services	1,230	3.1
Other Services	1,250	3.2
Other Services, Except Public Administration	1,250	3.2
Public Administration	-	-
State Government	**1,490**	**3.8**
Local Government	**6,440**	**16.3**

Source: OSHA calculation from BLS, 2023b; BLS, 2023g; and BLS, 2023h.

Note: Because of rounding and data exclusion for detailed categories that did not meet the BLS publication guidelines, data may not sum to the totals. The SOII excludes all work-related fatalities as well as non-fatal work injuries and illnesses to the self-employed, to workers on farms with 10 or fewer employees, to private household workers; to volunteers, and to federal government workers.

C. Underreporting.

Based on an analysis of relevant academic literature (discussed in detail in Section V.A., Risk Assessment), OSHA has determined that heat-related occupational fatalities and HRIs are underreported due to (1) employers not being fully compliant with recordkeeping rules, (2) employees not reporting cases to their employers, (3) a lack of identifying heat as the cause of a heat-related injury or illness, and (4) the scope and inclusion criteria of the various surveillance data.

I. Underreporting of Heat-Related Fatalities.

BLS CFOI is well-regarded as the most complete and authoritative source on fatal workplace injuries and estimates of its magnitude of underreporting of occupational fatalities do not exist. However, there may be factors specific to heat-related fatalities that make CFOI particularly likely to misclassify the cause of death as being due to some other cause. This could mean that heat-related fatalities may be historically excluded from CFOI (e.g., cause of death is listed as cardiac arrest) or listed under another, not heat-specific Occupational Injury and Illness Classification System (OIICS) category (e.g., a worker faints due to heat exposure, falls from a height, and subsequently suffers a fatal traumatic injury). Additionally, as discussed in Section V.A., Risk Assessment, the documentation upon which BLS relies to code occupational fatalities (e.g., death certificates, coroner reports) may have limitations for heat-related fatalities due to the lack of expertise or experience of the individual determining the cause of death and whether the individual witnessed the events preceding the fatality. Therefore, OSHA has preliminarily determined that there is reason to believe that the number of heat-related fatalities in CFOI are undercounted, but precise estimates of this quantification do not exist.

II. OSHA's Underreporting Adjustment – Heat-Related Fatalities.

Heat-related fatalities are often identified in public health surveillance through review of International Classification of Diseases (ICD) codes listed in death certificates, which are known to be limited in their capture of heat as a cause-of-death (Shen et al., 1998). However, epidemiologists have increasingly used statistical techniques to identify excess deaths attributable to heat, both globally and in the United States, regardless of the cause-of-death listed on the death certificate. A recent study from 2020 estimated that, on average, 5,608 excess deaths were the result of heat each year between 1997 and 2006 in the 297 counties examined (representing approximately 62 percent of the U.S. population) or 9,045 excess deaths per year when extrapolated to the full nation (Weinberger et al., 2020). Estimates for similar time periods using the death certificate approach ranged from 618 to 658 heat-related deaths per year across the U.S. (Xu, 2012; Fowler et al., 2013). This would suggest that nationally heat-related deaths may be 13.7-to-14.6 fold undercounted. However, it is unclear if this ratio could be applied to CFOI estimates of occupational heat-related fatalities, as it is not clear what proportion of these excess deaths occurred among workers. Recent evidence from Mexico indicates that heat-related excess deaths are concentrated among working-age individuals and children (preprint by Wilson et al., 2024). If the same pattern holds in the U.S., then the undercounting estimates above (13.7-14.6) might be understating the magnitude of the undercount for workers. However, another recent study that examined heat-related excess deaths in Europe found that these deaths were predominantly concentrated among individuals over the age of 65 (Ballester et al., 2023). If this pattern were true for the

U.S., the undercounting estimates above might be overstating the magnitude of undercounting for workers. These two studies had important differences in methodology (e.g., use of exposure metric, use of observational weather data, and age groups analyzed) and underlying population (e.g., age distribution), and the researchers were not able to characterize work-related deaths. Given that the proportion of work-related deaths among the total estimated excess heat-related deaths in the U.S. is unknown, OSHA did not adjust the ratio derived from comparing Weinberger et al.'s estimates to Xu and Fowler et al.'s counts. Therefore, for this analysis, OSHA estimates that occupational fatalities due to heat are undercounted by a factor of 14. Additional values of the undercount—both higher and lower—are presented later in this section in a sensitivity analysis. OSHA welcomes comment on the estimates of avoided fatalities, the underreporting adjustment, data sources, and methodologies employed here. The agency welcomes additional studies that OSHA should consider and comment on whether there are more appropriate underreporting factors that should be used to adjust reported fatalities in the final economic analysis.

III. Underreporting of Non-Fatal HRIs.

As discussed in Section V.A., Risk Assessment, researchers and government agencies have long acknowledged the shortcomings of BLS's SOII in accurately estimating all non-fatal occupational injuries and illnesses. One limitation is the scope of cases for which BLS has historically reported enough information to identify HRIs—only those cases involving days away from work.[99] Another limitation of SOII is the reliance on employer-reported data, as research has demonstrated that employers are not always fully compliant with recordkeeping rules. Quantifying the magnitude of the undercounting of SOII is difficult, but comparisons to workers' compensation and other databases provide some context for the potential magnitude of undercounting.

IV. OSHA's Underreporting Adjustment – Non-Fatal HRIs.

The best available estimates of the magnitude of the underreporting of injuries and illnesses comes from a 2014 study funded by BLS that compared state-based surveillance data from California (specifically the Workers' Compensation Information System, data from healthcare facilities across the state, and Doctors' First Reports of Occupational Illness or Injury) to BLS SOII microdata for both carpal tunnel syndrome and amputations from 2007–2008 (Joe et al., 2014). In this study, researchers linked individual cases in each dataset to the corresponding case in other datasets to obtain a better estimate of the total number of cases for each outcome occurring in California during this time. They found that the state-based data sources contained 5 times more amputations and 10 times more carpal tunnel syndrome cases than were reported in the BLS SOII data. Joe et al. (2014) also found that about 30 percent of SOII cases were not captured in the state database which suggests that both sources are failing to capture some injuries.

[99] BLS expanded their publication of case and demographic data for injury and illness cases involving days of job transfer or restriction (DJTR) with the introduction of biennial estimates in 2021–2022. (https://www.bls.gov/iif/notices/2022/biennial-estimates.htm)

While Joe et al. (2014) was not specific to heat, a more recent study from California compared the number of HRI claims in the state's Workers' Compensation Information System to the estimated number of HRIs reported in BLS SOII for the same years (2009–2017) (Heinzerling et al., 2020). Heinzerling et al. found 3–6 times the number of HRI cases estimated by SOII in the state's workers' compensation database each year. While this study did not match individual cases as was done in Joe et al. (2014), it is reasonable to assume that similar to the findings in that study, some HRIs that were captured by the SOII data were not captured by the state's workers' compensation data. This would mean that there are even more cases in the state database that are not captured in SOII (which would mean the undercount estimate of 3-6 times is an underestimate). It is also possible that the workers' compensation database examined by Heinzerling et al. (2020) is missing HRIs. In Joe et al., 2014, approximately 54–74 percent of cases identified in the healthcare facility data were only found in that dataset and 46 percent of cases identified in the Doctors' First Reports data were found only in that dataset. This suggests that the number of cases Heinzerling et al. (2020) identified in the workers' compensation data that they compared to BLS SOII may itself have been an undercount.

Finally, simply comparing the total number of recorded occupational fatalities annually to the total number of annual recorded non-fatal injuries and illnesses suggests potentially significant underreporting of HRIs. For each occupational death in 2022, there were about 965 medically consulted work-related injuries (4,695 fatalities to 4,530,000 medically consulted injuries based on data from the National Safety Council (NSC, n.d.)).

In 2022, for each occupational fatality, there were about 639 recordable injuries and illnesses (5,486 fatalities to 3.5046 million recordable cases (BLS, 2024c; BLS, 2023b)). This ratio is generally consistent across a number of specific causes or types of occupational fatalities and non-fatal injuries and illnesses. Similarly, for heat-specific cases, a ratio of 1,000 emergency department visits and hospitalizations per 1.4 fatalities was reported in a 2011 analysis by the Florida Department of Health (Florida DOH, 2011; also discussed in Section V.A., Risk Assessment). As such, the ratio of heat-related fatalities to HRIs (about 82 HRIs for every one fatality) from the data that OSHA is relying on for its estimate of benefits indicates an unusually low number of HRIs. Based on the reported number of occupational heat-related fatalities (which OSHA believes, and research supports, is an underestimate) of 40 per year, the expected number of HRIs would be around 38,000 per year versus the 3,288 reported annual HRIs (assuming the relationship between fatalities and non-fatal injuries and illnesses is similar for heat-related fatalities and injuries and illnesses and the all-cause mortality and injury and illness numbers).

Based on these studies, OSHA has preliminary determined that the range of estimates reported in Joe et al. (2014) (i.e., 5–10 times more cases than in the SOII data) are the best available estimates on the magnitude of undercounting of occupational injuries and illnesses by BLS SOII. These values are supported by Heinzerling et al. (2020) which found 3–6 times the number of HRI cases but which had limitations likely leading to an underestimation of the magnitude. OSHA welcomes comment on this adjustment, submission of additional data or studies that would help the agency refine this estimate, and suggestions on alternative methodologies.

V. Underreporting-Adjusted HRIs and Heat-Related Fatalities.

Based on this analysis, OSHA estimates that HRIs are undercounted by a factor of 7.5 (mid-point of 5 and 10) and heat-related fatalities are undercounted by a factor of 14. Applying these factors to BLS' reported 39,450 HRIs and 479 fatalities, OSHA estimates an underreporting adjusted total of 295,875 HRIs and a total of 6,706 heat-related fatalities from 2011 to 2022, an annual average of 24,656 and 559 per year respectively. Additional values of the undercount—both higher and lower—are presented later in this section in a sensitivity analysis.

III. Monetized Health and Safety Benefits.

As explained in Section V.C., Risk Reduction, OSHA has preliminarily determined, based on a review of academic literature on the effectiveness of heat injury and illness prevention methods, that full compliance with this proposed standard would reduce heat-related fatalities by 99.8–100 percent and HRIs by 37–96 percent. For this benefits analysis, OSHA is assuming an effectiveness of 95 percent for fatalities and 65 percent of HRIs. The effect of different assumptions on the outcome of this benefits analysis are discussed below in the sensitivity analysis.

Applying the undercount adjustment to BLS-reported heat-related fatalities and HRIs discussed above by factors of 14 and 7.5 respectively, OSHA estimates that the proposed standard will prevent 531 heat-related fatalities per year (of the estimated 559 fatalities) and 16,027 HRIs per year (of the estimated 24,656 HRIs) under the assumptions of 95 percent effectiveness for heat-related fatalities and 65 percent effectiveness for HRIs[100]. Using the 2022 estimate of the value of a statistical life (VSL) developed by the Department of Transportation (DOT)[101] and converting to 2023 dollars using the GDP deflator (BEA, 2024), $13.77 million, OSHA estimates the monetized benefits from avoided fatal heat-related incidents in the first year would be $7.310 billion. OSHA monetized benefits of avoided HRIs using the midpoint of the range of the value of a statistical injury (VSI) cited in Viscusi and Gentry (2015), converted to 2023 dollars using the GDP deflator, $116,588 per injury.[102] The estimated monetized benefits from avoided HRIs are $1.869 billion per year. Total benefits each year for avoided heat-related fatalities and HRIs are $9.179 billion .

IV. Additional Unquantified Potential Benefits.

OSHA believes the proposed standard may provide several additional potential benefits beyond the avoided direct heat-related fatalities and HRIs captured in the monetized health and safety benefits. These potential benefits include avoided indirect fatal and non-fatal injuries related to heat exposure, increased labor supply, and increased utility for employees. The agency’s estimate of monetized health and safety benefits has

[100] OSHA assumes that the proposed standard is equally effective at preventing fatalities and HRIs that are currently reported in the economic data and those that are currently unreported. The agency welcomes comment on this assumption.

[101] Available at *https://www.transportation.gov/office-policy/transportation-policy/revised-departmental-guidance-on-valuation-of-a-statistical-life-in-economic-analysis* (DOT, 2024). The 2022 estimate was based on a comprehensive 2021 Department of Transportation guidance update, available at *https://www.transportation.gov/sites/dot.gov/files/2021-03/DOT%20VSL%20Guidance%20-%202021%20Update.pdf* (DOT, 2021).

[102] OSHA welcomes comment regarding this VSI estimate and whether it is an appropriate value given that HRIs may be less severe than other injuries and illnesses typically considered in the VSI derivation. The agency welcomes suggestions on alternative VSI estimates for HRIs as well as supporting data, methodologies, or studies that would help the agency refine this estimate.

not incorporated benefits for these factors. The values presented here are shown to demonstrate the potential magnitude of these benefits but are highly uncertain and, therefore, not incorporated into the main quantified estimate of the benefits of this proposed standard.

A. Indirect Fatalities and Non-Fatal Injuries.

As discussed in detail in Section V.A., Risk Assessment, and Section IV., Health Effects, workers face additional risks from working in hot environments other than the direct physical effects of heat on the employee's body. Indirect injuries that are caused by the physiological effects of heat stress, but are not themselves, heat exhaustion or heat stroke (i.e., falling, motor vehicle accidents, etc.). Direct HRIs and fatalities are those caused by the effects of heat on the body without the involvement of other factors. The underreporting adjustments in the benefits analysis may not capture or only capture some of the underreporting of indirect HRIs and heat-related fatalities. Researchers have used the natural fluctuations in temperatures to conduct quasi-experimental studies examining the relationship between heat and workers' compensation claims for traumatic injuries (Spector et al., 2016; Calkins et al., 2019; Dillender, 2019; Park et al., 2021; Negrusa et al., 2024). These papers' findings suggest that there may be many workers' compensation claims that are heat-related but not coded as such. For instance, Park et al. (2021) estimated that approximately 20,000 injuries per year in California between 2001 and 2018 were caused by hotter temperatures (relative to "optimal" temperature). For comparison, for a similar time period (2000–2017), Heinzerling et al. (2020) only identified an average of 889 HRI workers' compensation claims per year in California (a

22-fold difference), suggesting that relying on workers' compensation claims for HRIs alone does not capture the higher incidence of injuries of other kinds where heat may have played a role. OSHA has not included a quantified value of potentially avoided indirect heat-related fatalities and non-fatal occupational injuries, but these studies suggest that heat may contribute to additional impacts on employees and that these impacts may be significant. Because of this, the benefits of this proposed standard may be greater than what OSHA estimates in the primary estimate.

If the relationship between directly- and indirectly-caused heat-related non-fatal injuries found in Park et al. (2021) was representative of the true relationship, the number of occupational direct and indirect heat-related non-fatal injuries may be as high as 72,000 annually (based on the BLS-reported annual non-fatal injuries of 3,288 and an estimate of 22 indirect heat-related injuries per 1 direct heat-related injury). Assuming the proposed standard prevented 65 percent of these indirect non-fatal injuries, it might prevent a total of 47,000 indirect non-fatal injuries each year. Monetizing those avoided injuries would represent about an additional $5.5 billion in benefits (using a VSI of $116,588 per avoided injury). If the relationship between non-fatal injuries and fatalities seen for occupational injuries and fatalities in general of one fatality for every 1,000 injuries holds for these accidents, this means that there might be 72 indirect heat-related fatalities annually.[103] Given that these are caused by different factors besides heat and so

[103] This calculation uses a more generalized ratio of occupational injuries to fatalities than those discussed previously based on NSC and BLS data (NSC, n.d.; BLS, 2023b; BLS, 2024c). If the NSC-derived ratio of 965 injuries to one fatality were more accurate, there could be about 75 indirect heat-related fatalities annually. If the BLS-derived ratio of 639 injuries to one fatality were correct, the indirect heat-related fatalities could be around 113 annually.

may be preventable at lower rates than direct heat-related fatalities, assuming preventability equal to the preventability of non-fatal injuries, this proposed standard might prevent an additional 46 indirect heat-related fatalities annually. Monetized, this would mean additional benefits of $644 million.

B. Worker Disutility and Decreased Labor Supply.

There is a lengthy economic literature that suggests that humans have strong preferences for not being exposed to extreme temperatures. Roback (1982) and Sinha et al. (2018) used revealed preference techniques and found that most people experience non-trivial direct disutility[104] from exposure to extreme temperatures and that they are willing to pay non-trivial amounts to mitigate those exposures where they can. Studies of real world responses to extreme temperatures including Graff Zivin and Neidell (2014) and Rode et al. (2022) found that workers decrease the amount of labor they are willing to supply (i.e., for workers who are able to do so, they will shorten their work day or choose to not work on a certain day) when temperatures are extreme (with a greater decrease in labor supplied when temperatures are extremely hot versus when they are extremely cold) suggesting that workers prefer to forgo wages rather than be exposed to extreme temperatures. In cases where labor markets are imperfectly competitive, workers might benefit from this proposed standard because they do not have the option to avoid exposure to extreme temperatures, even if they were willing to forgo wages (for more on the implications of imperfect labor market competition for compensating differentials,

[104] In economic terms, disutility is the negative or harmful effects of some activity or economic transaction. In economics, individuals are assumed to try to maximize their utility (and conversely minimize their disutility).

see, e.g., Burdett and Mortensen, 1998; Sorkin, 2018). While the interventions in this proposed standard will not eliminate the need for work to be performed in hot environments, to the extent that these interventions mitigate some of the physical discomfort caused by heat, employees may experience a decrease in the disutility they face due to working in hot environments.

While an individual's utility or disutility is difficult to measure, Li et al. (2020) found that people expressed a willingness to pay (WTP) between $2.60 and $4.60 per day to avoid a hot day. WTP may not already be satisfied in the labor market as a result of imperfect competition, imperfect information, binding minimum wages, or other features of the market. This is not perfectly analogous to utility but gives a range for the value that individuals place on avoiding excessive heat. Assuming a point estimate of a WTP of $3 per day[105] to mitigate the physical discomfort of working in hot environments, all employees in the scope of this proposed standard receiving heat protections for 30 days on average would equal benefits of $3.236 billion. Employees in many parts of the country work in hot conditions for many more than 30 days, meaning that, if benefits to workers to mitigate the negative physical effects of heat that do not rise to the level of a

[105] This assumes a value on the lower end of what Li et al. (2020) estimated since this proposed standard will not entirely remove most employees from hot environments. There are arguments to be made that this might be an underestimate for a few reasons. First, people have a higher WTP to avoid very high temperatures so where this proposed standard improves conditions for employees exposed to very high temperatures, their WTP might be higher. Second, those surveyed by Li et al. (2020) were not necessarily workers who were working in high heat. Employee's WTP for heat mitigating measures might be higher than a general individual's WTP to avoid hot days in general since employees have to perform physical labor in those hot environments and because employees have less control over workplace factors like resting, clothing choices, or the ability to stay inside or to relocate somewhere with air conditioning. Finally, those surveyed by Li et al. (2020) may have included nonworking individuals who may have a lower income and therefore a lower WTP than individuals who are working for wages.

heat injury or illness were captured and monetized, the benefits of this proposed standard may be even greater than those shown by the monetized safety and health benefits.

Graff Zivin and Neidell (2014) found that workers with high exposure to heat reduced their labor supply by as much as one hour per day when the temperatures were above 85°F.[106] Based on an average loaded hourly wage of $43.60 (the average for all at-risk workers in the scope of the proposed standard), if employees working in the hottest environments (assumed here to be the sum of workers exposed to process heat and outdoor workers) supply 5 additional hours of labor each over the course of a year, they would cumulatively receive additional wages of $3.877 billion. Measures that improve the comfort of employees and reduce the negative physical effects of heat could easily result in the small increase in labor supply discussed here. As mentioned previously, employers benefit when employees produce more so the benefits of increased labor supply would be more than just the increased wages paid to employees—employers' revenue would increase because of increased employee output as well.

V. Uncertainty.

A few factors contribute to uncertainty in the estimates of the benefits of this proposed standard including potential underreporting of heat-related fatalities and HRIs, uncertainty of the effectiveness of the interventions required by the proposed standard, and potential benefits of improved labor productivity.

A. Underreporting.

[106] Note that this change in labor supply refers to real world effects seen where workers choose to work fewer hours when temperatures are excessively hot or cold (e.g., ending their workday early, choosing to not work on certain days) and is different from the productivity effects of rest breaks discussed elsewhere.

As discussed earlier, OSHA believes the number of HRIs and heat-related fatalities estimated from the BLS data is likely underestimated compared to the true number of HRIs and heat-related fatalities in the United States. Research suggests that HRIs and heat-related fatalities are underreported in multiple datasets (e.g., BLS CFOI, BLS SOII, workers' compensation claims data, and hospital discharge data). The general underreporting and undercounting of occupational injuries and illnesses has been a topic of multiple government reports (e.g., Ruser, 2008; Miller, 2008; GAO, 2009; Wiatrowski, 2014). While there is a good deal of agreement that some level of underreporting exists for occupational injuries and illnesses in general and HRIs specifically, there is uncertainty regarding the magnitude of underreporting. OSHA has adjusted for underreporting of HRIs and heat-related fatalities but there remains a wide range of estimates of underreporting in the research. There still remains a high level of uncertainty in these estimates and the magnitude of underreporting is potentially considerably higher than what OSHA has estimated. If the HRIs were underreported by a factor of 10 rather than 7.5 (which is plausible based on the available evidence) and this proposed standard has the same effectiveness, it could prevent about an additional 11,500 HRIs which could account for an additional $1.342 billion in benefits.

B. Program Effectiveness.

As explained above, for this benefits analysis, OSHA assumes that the proposed standard will be 65 percent effective in curbing HRIs. This topic, the relevant literature, and how the agency arrived at its estimates of the standard's effectiveness are discussed in-depth in Section V.C., Risk Reduction. As discussed previously, OSHA found that the literature on this issue lacks certainty. Few studies included a concurrent control group, rather most studies looked at rates of HRI before and after an intervention in the same group. Studies were generally performed on specific industries, or in specific settings, and the effectiveness of the intervention might be higher or lower than the study average across the firms and employees covered by this rule. Additionally, no study tested an intervention that would exactly match the controls required by the proposed standard. For example, McCarthy et al. (2019) report a 60–90 percent decrease in the odds of HRI among municipal outdoor workers in Texas after a Heat Stress Awareness Program (HSAP) intervention was implemented in 2011. However, this study lacked a control group that received no intervention making it difficult to determine if the reported effectiveness could be attributed to the intervention. While OSHA assumed the effectiveness of the proposed standard in preventing HRIs to be on the lower end of what McCarthy et al. (2019) found, there is evidence that the effectiveness of heat interventions may be much higher than that (See Section V.C., Risk Reduction, for additional discussion).

If the proposed standard were more effective at preventing heat-related fatalities and HRIs than OSHA estimates in this analysis (and based on available evidence this is plausible, see Section V.C., Risk Reduction) and prevented all fatalities (100 percent versus 95 percent) and 10 percent more HRIs (75 percent versus 65 percent), the proposed standard might prevent 28 more fatalities and about 2,500 more non-fatal injuries and illnesses annually. Monetized, this represents approximately an additional $672 million in benefits.

C. Labor Productivity Losses.

As discussed above in Section VIII.E.IV.A., OSHA has preliminarily determined, based on numerous studies, that there are labor productivity losses from working in the heat that can be partially recovered through the provision of rest breaks. However, precisely defining the magnitude of labor productivity losses that could be recuperated under the proposed standard is difficult with the current research available. This analysis rests on specific assumptions and is dependent on the extent of the available literature, in which heat and productivity were assessed in different settings with different break policies, but break policies did not vary within the same setting. OSHA mentions those impacts here, as well, to acknowledge the uncertainty associated with those estimates. This factor is examined in the sensitivity analysis (Section VIII.C.VI) in Section VIII.C. Costs of Compliance.

VI. Sensitivity Analysis.

OSHA considers the rate of effectiveness of the various measures of this proposed standard a major source of uncertainty in the calculation of benefits. OSHA has compiled a sensitivity analysis to illustrate the range that could depict the benefits estimate. As shown below in Table VIII.E.6. for the low estimate, OSHA estimated program effectiveness to be 50 percent for HRIs and 90 percent for heat-related fatalities (as opposed to the primary estimate of 65 percent effectiveness for HRI prevention and 95 percent effectiveness for fatality prevention). For the high estimate, OSHA estimated 100 percent effectiveness for the prevention of both heat-related fatalities and HRIs by the proposed standard (as opposed to the primary estimate of 65 percent effectiveness for HRI prevention and 95 percent effectiveness for fatality prevention).

At the 50 percent level of effectiveness, OSHA calculated monetized benefits of avoided HRIs of $1.437 billion. At the 90 percent level of effectiveness, OSHA calculated monetized benefits of avoided heat-related fatalities of $6.926 billion. Both estimates use the same VSI and VSL discussed above. Total monetized benefits at the 50 and 90 percent level of effectiveness are $8.363 billion per year.

At the 100 percent level of effectiveness, the monetized benefits of avoided HRIs are $2.875 billion per year. The monetized benefits of avoided heat-related fatalities at the same level of effectiveness are $7.696 billion. Both estimates use the same VSI and VSL discussed above. Total monetized benefits per year for the 100 percent level of effectiveness are $10.570 billion.

The sensitivity analysis also looked at the impact on the estimated number of avoided HRIs and heat-related fatalities under different assumptions of underreporting, specifically (1) alternative assumptions for the underreporting related to HRIs, assuming factors of 2 or 10 or no underreporting and (2) alternative assumptions regarding the underreporting of heat-related fatalities, assuming that heat-related fatalities were underreported by factors of 3 or 15 or not underreported at all. The estimated number of avoided HRIs and avoided heat-related fatalities under these alternative assumptions of underreporting are presented in Tables VIII.E.6. and VIII.E.7. with OSHA's primary estimate of effectiveness as well as under the low and high levels of effectiveness discussed above.

Total monetized benefits per year from avoided heat-related fatalities and HRIs under different assumptions of program effectiveness and underreporting are presented in Table VIII.E.8.

Table VIII.E.6. Sensitivity Analysis – HRIs

	Primary Estimate (65 % Effectiveness)	**Low Estimate (50 % Effectiveness)**	**High Estimate (100% Effectiveness)**
Cases – No underreporting adjustment	2,137	1,644	3,288
Cases - Low underreporting (2X)	4,274	3,288	6,575
Cases - High underreporting (10X)	21,369	16,438	32,875
Cases – Primary estimate underreporting (7.5X)	16,027	12,328	24,656
Monetized benefits, no underreporting adjustment	$249,133,988	$191,641,529	$383,283,058
Monetized benefits, low underreporting (2X)	$498,267,975	$383,283,058	$766,566,116
Monetized benefits, high underreporting (10X)	$2,491,339,876	$1,916,415,290	$3,832,830,579
Monetized benefits, OSHA primary estimate underreporting (7.5X)	$1,868,504,907	$1,437,311,467	$2,874,622,934

Source: OSHA estimate.

Table VIII.E.7. Sensitivity Analysis – Heat-Related Fatalities

	Primary Estimate (95% Effectiveness)	**Low Estimate (90% Effectiveness)**	**High Estimate (100% Effectiveness)**
Cases - No underreporting adjustment	37.9	35.9	39.9
Cases – Low underreporting (3X)	113.8	107.8	119.8

Table VIII.E.7. Sensitivity Analysis – Heat-Related Fatalities

	Primary Estimate (95% Effectiveness)	**Low Estimate (90% Effectiveness)**	**High Estimate (100% Effectiveness)**
Cases – High underreporting (15X)	568.86	538.92	598.8
Cases – Primary estimate underreporting (14X)	530.936	502.992	558.88
Monetized benefits, no underreporting adjustment underreporting	$522,213,480	$494,728,560	$549,698,400
Monetized benefits, low underreporting (3X)	$1.566,640,440	$1,484,185,680	$1,649,095,200
Monetized benefits, high underreporting (15X)	$7,833,202,200	$7,420,928,400	$8,245,476,000
Monetized benefits, primary estimate underreporting (14X)	$7,310,988,720	$6,926,199,840	$7,695,777,600

Source: OSHA estimate.

Table VIII.E.8. Sensitivity Analysis - Total Estimated Benefits

	Primary Underreporting Estimate	**No Underreporting**	**Low Underreporting**	**High Underreporting**
Monetized Health and Safety Benefits				
Low Effectiveness	$8,363,511,307	$686,370,089	$1,867,468,738	$9,337,343,690
High Effectiveness	$10,570,400,534	$932,981,458	$2,415,661,316	$12,078,306,579
OSHA Primary Estimate Effectiveness	$9,179,493,627	$771,347,468	$2,064,908,415	$10,324,542,076

Source: OSHA estimate.

VII. Conclusion.

Uncertainty as to the magnitude of underreporting and uncertainty as to the effectiveness of the interventions prescribed by this proposed standard create substantial uncertainty in the calculation of monetized benefits. Additional uncertainty is added by the magnitude of labor productivity benefits from the required rest breaks. With the caveat of multiple areas of uncertainty, OSHA preliminarily concludes that this proposed standard would have an estimated $9.179 billion in total annualized benefits.

F. Initial Regulatory Flexibility Analysis, Small Business Regulatory Enforcement Fairness Act, and Executive Order 13272 (Proper Consideration of Small Entities in Agency Rulemaking).

I. Introduction.

The RFA, 5 U.S.C. 601 et seq., as amended by the Small Business Regulatory Enforcement Fairness Act of 1996, Public Law 104-121 (Mar. 29, 1996), hereafter jointly referred to as the RFA, requires Federal agencies to consider the economic impact of a proposed rulemaking on small entities. The RFA states that whenever a federal agency is required to publish a general notice of proposed rulemaking, the agency must prepare and make available for public comment an initial regulatory flexibility analysis (IRFA) (5 USC 603(a)). Pursuant to section 605(b), instead of an IRFA, the head of an agency may certify that the proposed rule will not have a significant economic impact on a substantial number of small entities. A factual basis must support a certification. If the head of an agency makes a certification, the agency shall publish such certification in the *Federal*

Register at the time of publication of a general notice of proposed rulemaking or at the time of publication of the final rule (5 USC 605(b)).

To determine whether OSHA can certify that the proposed standard for Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings will not have a significant economic impact on a substantial number of small entities, OSHA has developed a screening test to consider the minimum threshold effects of the proposed rule on small entities. This screening test is similar in concept to the revenue test used in Section VIII.D., Economic Feasibility, to identify minimum threshold effects to demonstrate economic feasibility. However, for this IRFA the screening test is applied not to all establishments but to small entities (called "small business concerns" by SBA).

OSHA is not able to certify that the proposed rule will not result in a significant economic impact on a substantial number of small entities, thus triggering the need for an IRFA. Under the provisions of the RFA, as amended in 1996, each such analysis shall contain:

1. A description of the reasons why action by the agency is being considered;
2. A succinct statement of the objectives of, and legal basis for, the proposed rule;
3. A description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply;
4. A description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirements and the type of professional skills necessary for the preparation of the report or record;

5. An identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule; and

6. A description and discussion of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities, such as:

   (a) The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;

   (b) The clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;

   (c) The use of performance rather than design standards; and

   (d) An exemption from coverage of the rule, or any part thereof, for such small entities (5 USC 603, 607). The RFA further states that the required elements of the IRFA may be performed in conjunction with or as part of any other agenda or analysis required by any other law if such other analysis satisfies the provisions of the IRFA (5 USC 605). The remaining sections of this chapter address each of the components listed above.

II. Initial Regulatory Flexibility Analysis.

A. Description of the Reasons Why Action by the Agency Is Being Considered.

Heat is the leading cause of death among all weather-related phenomena in the United States. Excessive heat exacerbates existing health conditions (e.g., asthma and heart disease) and can cause heat stroke and even death if not treated properly and promptly. Heat-related illnesses are adverse clinical health outcomes that occur due to exposure to heat (e.g., heat exhaustion or heat stroke). A heat-related injury is an injury linked to heat exposure (e.g., a fall that occurred while a person was experiencing dizziness related to heat exposure).

Employees in both outdoor and indoor work settings without adequate climate controls are at risk of hazardous heat exposure, which may lead to heat-related illnesses and injuries (HRIs). Certain heat-generating processes, machinery, and equipment (e.g., hot tar ovens, furnaces) can also cause HRIs when effective cooling measures are not in place. Some groups, such as pregnant employees, may be more likely to experience adverse health effects from heat. In contrast, others are disproportionately employed in work settings with a higher risk of HRI, such as workers of color in essential jobs.

The BLS SOII estimates that there have been 39,450 work-related HRIs involving days away from work between 2011 and 2022, for an average of 3,288 HRIs of this severity occurring per year during this period. Additionally, according to the BLS CFOI, exposure to environmental heat has killed 479 U.S. workers from 2011-2022, with an average of 40 fatalities per year during that period. As explained in Section V.A., Risk Assessment, these statistics likely do not capture the true magnitude and prevalence of heat-related injuries, illnesses, and fatalities. OSHA's estimates of the annual incidents of heat-related fatalities and HRIs and the number the agency expects will be avoided by this proposed standard can be found in Section VIII.E., Benefits.

OSHA has developed and published recommendations for heat injury and illness prevention. However, in the absence of a federal standard, multiple states have issued regulations to address heat hazards in the workplace. Five states have enacted laws that aim to protect employees exposed to heat: Minnesota (Minn. R. 5205.0110); California (Cal. Code of Regs. title 8, § 3395); Washington (Wash. Admin. Code § 296-62-095 through § 296-62-09560; § 296307-097 through § 296-307-09760); Oregon (Or. Admin. R. 437-002-0156; Or. Admin. R. 437004-1131); and Colorado (7 Colo. Code Regs § 1103-15:3).

OSHA has received multiple petitions to promulgate a heat injury and illness prevention standard in recent years, including in 2018 from Public Citizen, on behalf of approximately 130 organizations. Members of Congress have also urged OSHA to initiate rulemaking for a federal heat standard.

In the *Federal Register*, OSHA published an Advance Notice of Proposed Rulemaking (ANPRM) for Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings on October 27, 2021 (86 FR 59309). From the ANPRM, OSHA initiated the rulemaking process to consider a heat-related injury and illness prevention standard. The standard would set forth the employer's obligations and the measures necessary to protect employees to reduce the number of HRIs and fatalities more effectively among workers. The goal is to prevent or reduce the number of occupational HRIs and fatalities caused by exposure to hazardous heat.

OSHA has developed potential options for various elements of a heat-specific standard using: stakeholder comments from the ANPRM; academic literature; best practices from state heat-specific standards; recommendations from the National Institute for Occupational Safety and Health (NIOSH) and the National Advisory Committee on

Occupational Safety and Health (NACOSH); and other input from experts, stakeholders, and the public.

As described in the benefits analysis in Section VIII.E., OSHA estimates that approximately 559 heat-related fatalities and approximately 24,656 HRIs among employees occur annually. However, as explained in that section, OSHA also believes there remains a great deal of uncertainty surrounding the extent of underreporting, other parameters used in this estimate.

B. Statement of the Objectives of and Legal Basis for the Proposed Rule.

The objective of the proposed standard is to reduce the number of HRIs and fatalities due to exposure to hazardous heat occurring among employees in the course of their work. This objective would be achieved by requiring employers to establish heat injury and illness prevention plans (HIIPPs); identify and monitor heat hazards, provide rest breaks, adequate water, and training; plan for, and be ready to respond to, heat emergencies; and take other steps to ensure that employees can perform their duties safely.

The legal basis for the rule is discussed in depth in Section II., Pertinent Legal Authority. In short, Congress enacted the Occupational Safety and Health (OSH) Act of 1970 (29 USC 651 et seq.), “to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources” (29 USC 651(b)). To that end, Congress authorized the Secretary of Labor “to set mandatory occupational safety and health standards applicable to businesses affecting interstate commerce” (29 USC 651(b)(3); see also 29 USC 655(b)).

The OSH Act imposes several requirements OSHA must satisfy before adopting a safety standard. Among other things, the standard must provide a high degree of employee protection, substantially reduce a significant risk to workers, be technologically feasible, and be economically feasible (see 58 FR 16612, 16614–16 (Mar. 30, 1993); *Int'l Union, United Auto., Aerospace & Agric. Implement Workers of Am.* v. *OSHA,* 37 F.3d 665, 668–69 (D.C. Cir. 1994)). A standard is technologically feasible if the protective measures it requires already exist, can be brought into existence with available technology, or can be created with technology that is reasonably expected to be developed (see *Am. Iron and Steel Inst. v. OSHA*, 939 F.2d 975, 980 (D.C. Cir. 1991)). In determining economic feasibility, OSHA must consider the cost of compliance in an industry rather than on individual employers. In its economic analyses, OSHA "must construct a reasonable estimate of compliance costs and demonstrate a reasonable likelihood that these costs will not threaten the existence or competitive structure of an industry, even if it does portend disaster for some marginal firms" (*Am. Iron and Steel Inst.*, 939 F.2d at 980, quoting *United Steelworkers of Am.* v. *Marshall,* 647 F.2d 1189, 1272 (D.C. Cir. 1980)).

C. Description and Estimate of the Number of Small Entities to Which the Proposed Rule Will Apply.

Section VIII.B., Profile of Affected Industries, of this PEA presents OSHA's preliminary analysis of the type and number of small entities to which the proposed rule would apply. To estimate the number of small entities potentially affected by this rulemaking, OSHA used definitions developed by SBA for each sector as well as the definition of a small government and small non-profit entity according to the RFA.

OSHA estimates the proposed rule would affect approximately 2.0 million small entities. Across these small entities, roughly 16.2 million employees would be protected by the proposed rule. Table VIII.F.1. presents counts of small and very small entities, establishments, and employees by industry and region.

Table VIII.F.1. Profile of Small and Very Small Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Small (SBA/RFA)			Very Small (<20)		
	Entities	Establishments	Employees	Entities	Establishments	Employees
Agriculture, Forestry, and Fishing						
Alaskan	475	478	831	466	466	544
Central	24,294	24,322	149,091	15,065	15,065	55,208
Eastern	16,193	16,208	115,421	12,736	12,738	53,826
Pacific	199	199	1,399	138	138	1,082
Southern	26,346	26,377	169,979	17,326	17,331	62,951
Western	16,211	16,268	314,889	10,009	10,012	58,338
Subtotal	**83,717**	**83,853**	**751,608**	**55,739**	**55,750**	**231,950**
Building Materials and Equipment Suppliers						
Alaskan	14	15	216	27	27	202
Central	1,192	1,282	25,975	2,192	2,231	18,113
Eastern	1,999	2,128	40,838	3,358	3,409	27,914
Pacific	38	41	679	52	52	395
Southern	1,814	1,946	34,426	2,855	2,898	23,385
Western	1,509	1,596	28,722	2,311	2,345	18,858
Subtotal	**6,566**	**7,009**	**130,856**	**10,795**	**10,962**	**88,866**
Commercial Kitchens						
Alaskan	509	579	4,603	430	432	1,745
Central	36,119	40,201	472,283	26,822	26,939	130,727
Eastern	65,298	69,963	724,441	51,676	51,830	233,251
Pacific	1,282	1,388	16,812	946	949	4,411
Southern	42,239	47,058	571,817	31,027	31,159	145,802
Western	38,954	43,511	487,920	29,838	30,051	149,486
Subtotal	**184,402**	**202,700**	**2,277,876**	**140,740**	**141,361**	**665,422**
Construction						
Alaskan	2,383	2,400	6,784	2,277	2,279	4,532
Central	158,425	158,752	562,118	147,997	148,028	315,449
Eastern	230,158	230,528	840,221	214,268	214,313	467,181
Pacific	3,308	3,317	15,761	2,986	2,986	8,179
Southern	163,896	164,295	695,987	149,782	149,827	359,212
Western	151,930	152,258	602,318	140,362	140,392	322,939

Table VIII.F.1. Profile of Small and Very Small Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Small (SBA/RFA)			Very Small (<20)		
	Entities	Establishments	Employees	Entities	Establishments	Employees
Subtotal	**710,101**	**711,550**	**2,723,189**	**657,671**	**657,825**	**1,477,491**
Drycleaning and Commercial Laundries						
Alaskan	17	19	95	16	17	69
Central	1,929	2,171	8,814	1,754	1,797	4,391
Eastern	5,626	5,994	17,624	5,330	5,438	10,761
Pacific	39	41	313	32	34	83
Southern	3,087	3,449	12,989	2,843	2,951	7,977
Western	2,352	2,501	8,319	2,214	2,268	5,138
Subtotal	**13,051**	**14,174**	**48,155**	**12,190**	**12,506**	**28,419**
Landscaping and Facilities Support						
Alaskan	105	109	1,938	98	99	860
Central	11,364	11,974	165,112	10,565	10,796	82,930
Eastern	18,330	19,096	270,325	17,103	17,308	131,677
Pacific	223	250	5,027	202	203	2,067
Southern	12,805	13,271	200,425	11,867	11,974	101,006
Western	9,634	9,974	152,217	8,953	9,030	77,219
Subtotal	**52,461**	**54,673**	**795,043**	**48,789**	**49,410**	**395,758**
Maintenance and Repair						
Alaskan	174	186	1,055	174	176	821
Central	19,068	19,653	108,461	19,174	19,344	84,101
Eastern	25,688	26,211	144,821	25,704	25,857	113,180
Pacific	304	318	1,926	304	306	1,384
Southern	20,023	20,552	117,782	20,239	20,395	87,092
Western	15,931	16,477	100,556	16,000	16,166	72,908
Subtotal	**81,188**	**83,397**	**474,600**	**81,595**	**82,245**	**359,487**
Manufacturing						
Alaskan	161	180	1,703	141	147	430
Central	28,332	29,454	617,095	20,447	20,529	95,353
Eastern	33,582	34,481	611,009	25,312	25,388	112,950
Pacific	282	288	2,422	248	248	818
Southern	24,499	25,279	450,901	18,822	18,884	83,417
Western	24,347	24,818	337,592	19,945	19,989	76,876
Subtotal	**111,203**	**114,500**	**2,020,722**	**84,915**	**85,185**	**369,844**
Oil and Gas						
Alaskan	53	61	692	29	29	70
Central	2,861	3,003	15,645	2,423	2,443	4,948
Eastern	1,391	1,458	9,518	1,116	1,125	2,497
Pacific	0	0	0	0	0	0
Southern	10,562	11,375	87,027	8,658	8,691	17,744
Western	1,561	1,631	9,034	1,306	1,308	2,807
Subtotal	**16,428**	**17,527**	**121,915**	**13,532**	**13,596**	**28,065**

Table VIII.F.1. Profile of Small and Very Small Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Small (SBA/RFA)			Very Small (<20)		
	Entities	Establishments	Employees	Entities	Establishments	Employees
Postal and Delivery Services						
Alaskan	21	33	34	18	18	26
Central	1,374	1,951	11,199	1,168	1,171	1,544
Eastern	2,238	3,001	18,998	1,899	1,900	2,351
Pacific	25	36	56	20	20	27
Southern	1,965	2,731	17,147	1,709	1,720	2,104
Western	1,533	2,081	17,285	1,302	1,309	1,733
Subtotal	**7,155**	**9,832**	**64,719**	**6,115**	**6,139**	**7,785**
Recreation and Amusement						
Alaskan	258	262	836	243	244	407
Central	9,660	9,978	76,652	8,093	8,131	23,284
Eastern	14,184	14,593	126,221	11,535	11,573	34,163
Pacific	176	182	1,996	131	131	387
Southern	9,058	9,335	79,313	7,510	7,547	22,207
Western	7,620	7,976	68,703	6,226	6,251	18,228
Subtotal	**40,956**	**42,326**	**353,720**	**33,738**	**33,877**	**98,674**
Sanitation and Waste Removal						
Alaskan	17	17	260	16	16	144
Central	598	613	11,803	519	519	5,716
Eastern	908	925	21,423	763	765	8,892
Pacific	13	16	510	10	10	186
Southern	579	600	13,810	481	482	5,650
Western	403	416	10,566	333	334	4,111
Subtotal	**2,517**	**2,586**	**58,372**	**2,120**	**2,125**	**24,699**
Telecommunications						
Alaskan	0	0	0	4	4	18
Central	6	6	28	281	303	1,237
Eastern	11	12	108	370	388	1,356
Pacific	0	0	0	2	3	13
Southern	14	16	124	341	361	1,341
Western	14	14	71	271	286	1,089
Subtotal	**46**	**48**	**332**	**1,269**	**1,344**	**5,054**
Temporary Help Services						
Alaskan	3	3	111	2	2	24
Central	746	785	58,271	487	490	4,506
Eastern	1,258	1,305	92,651	845	847	7,409
Pacific	9	10	1,444	5	5	43
Southern	1,001	1,064	81,872	663	666	5,193
Western	734	765	47,601	520	525	3,995
Subtotal	**3,752**	**3,933**	**281,950**	**2,522**	**2,537**	**21,170**
Transportation						

Table VIII.F.1. Profile of Small and Very Small Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Small (SBA/RFA)			Very Small (<20)		
	Entities	Establishments	Employees	Entities	Establishments	Employees
Alaskan	472	551	2,648	402	407	779
Central	35,362	35,967	100,567	32,172	32,196	40,920
Eastern	30,938	31,687	109,558	27,247	27,290	38,381
Pacific	336	378	3,401	248	252	513
Southern	30,063	31,185	121,185	26,656	26,726	38,318
Western	22,303	23,056	77,739	19,941	20,008	26,654
Subtotal	**119,474**	**122,823**	**415,098**	**106,667**	**106,879**	**145,566**
Utilities						
Alaskan	56	86	742	34	37	110
Central	1,169	2,078	18,326	711	760	2,076
Eastern	1,235	2,285	22,667	835	957	2,177
Pacific	12	25	105	9	9	28
Southern	2,393	3,494	28,343	1,911	1,960	4,049
Western	1,279	1,717	11,810	1,067	1,103	3,123
Subtotal	**6,144**	**9,686**	**81,995**	**4,568**	**4,826**	**11,564**
Warehousing						
Alaskan	21	22	126	10	10	17
Central	2,193	3,078	70,279	732	753	1,639
Eastern	2,820	3,920	105,756	1,034	1,051	2,412
Pacific	42	51	449	8	8	34
Southern	2,570	3,800	87,420	965	975	2,066
Western	2,035	2,888	67,352	806	820	1,817
Subtotal	**9,681**	**13,759**	**331,382**	**3,555**	**3,618**	**7,985**
Non-Core						
Alaskan	1,503	1,582	14,497	1,594	1,620	5,729
Central	109,785	114,774	1,251,037	117,012	117,910	428,271
Eastern	175,885	181,593	1,867,095	189,755	190,941	648,153
Pacific	2,738	2,857	22,687	2,818	2,851	9,578
Southern	133,234	138,262	1,099,714	147,342	148,376	508,465
Western	113,249	117,242	1,000,087	122,703	123,582	423,075
Subtotal	**536,394**	**556,310**	**5,255,118**	**581,225**	**585,280**	**2,023,270**
Total						
Alaskan	6,241	6,582	37,172	5,982	6,031	16,526
Central	444,478	460,042	3,722,756	407,614	409,405	1,300,411
Eastern	627,742	645,388	5,138,694	590,884	593,119	1,898,531
Pacific	9,027	9,397	74,988	8,161	8,205	29,227
Southern	486,148	504,089	3,870,261	450,999	452,925	1,477,979
Western	411,599	425,189	3,342,781	384,105	385,778	1,268,393
Total	**1,985,235**	**2,050,685**	**16,186,651**	**1,847,745**	**1,855,463**	**5,991,068**

Source: OSHA, based on BLS 2023c; Census Bureau, 2021a; Census Bureau, 2023a;Census Bureau, 2023d; SBA, 2023; USDA, 2019; and USFA, 2023.

Table VIII.F.1. Profile of Small and Very Small Affected Entities, Establishments, and Employees, by Core Industry and Region

Region	Small (SBA/RFA)			Very Small (<20)		
	Entities	Establishments	Employees	Entities	Establishments	Employees

Note: Due to rounding, figures in the columns and rows may not sum to the totals shown.

E. Description of the Projected Reporting, Recordkeeping, and Other Compliance Requirements of the Proposed Rule.

OSHA calculates costs for small entities, as defined by SBA (SBA, 2023) and the RFA, and for "very small" entities, defined by OSHA as those with fewer than 20 employees, in each industry. To estimate costs for these small and very small entities, OSHA first calculates for each 4-digit NAICS industry and state combination, the average one-time cost per establishment, average annual cost per establishment, average one-time cost per employee, and average annual cost per employee for each provision. Since OSHA assumes the indoor work area hazard evaluation is completed every five years, average per-establishment and average per-employee costs are taken for the corresponding cost items. OSHA then multiplies these estimates by the number of small, affected establishments or affected employees at small establishments to derive one-time and annual costs for each provision of the proposed standard. One-time costs are annualized to determine total annualized costs by provision of the proposed standard. This same methodology is applied to the very small business analysis.

Table VIII.F.2. below shows across all provisions of the proposed rule, that small entities are estimated to incur annualized costs of approximately $3.9 billion for 2.0 million entities while 1.8 million very small entities are estimated to incur annualized costs of about $2.2 billion. The costs by provision are shown below while the detailed discussion of the unit costs, other parameters, and methodology are included in Section VIII.C., Costs of Compliance. Requirements at or above the high heat trigger (which includes requirements for rest breaks) are the most expensive provision for small entities, accounting for almost half of overall costs. The second most expensive provision of this proposed rule for small entities is the requirements at or above the initial heat trigger provision, which accounts for about 12.5 percent of costs overall.

Table VIII.F.2. Total Costs of the Proposed Heat Injury and Illness Prevention Standard by Provision for Small Entities (2023$)

Provision	One-Time	Periodic Costs Annualized		Annual	Costs Savings	Total Annualized [a]	
		0%	2%			0%	2%
Rule Familiarization	$126,197,841	$0	$0	$0	$0	$12,619,784	$14,049,167
Heat Injury and Illness Prevention Plan	$797,869,328	$0	$0	$142,832,518	$0	$222,619,451	$231,656,540
Identifying Heat Hazards	$51,433,925	$216,486,243	$202,237,502	$270,810,603	$0	$297,602,620	$299,050,963
Requirements at or above the Initial Heat Trigger	$257,883,589	$0	$0	$651,324,232	$35,815,071	$641,297,520	$644,218,446
Requirements at or above the High Heat Trigger	$3,616,156	$0	$0	$6,173,098,461	$4,288,986,520	$1,884,473,557	$1,884,514,515
Heat Illness and Emergency Response and Planning	$203,967,646	$0	$0	$459,558,305	$0	$479,955,069	$482,265,315
Training	$822,601,053	$0	$0	$216,052,591	$0	$298,312,696	$307,629,910
Total	**$2,263,569,538**	**$216,486,243**	**$202,237,502**	**$7,913,676,711**	**$4,324,801,590**	**$3,836,880,698**	**$3,863,384,856**

Source: OSHA.

[a] The total costs with cost savings accounts for the potential labor productivity loss avoided by having more efficient and effective rest breaks required by the proposed standard than are currently taken.

Table VIII.F.3. Total Costs of the Proposed Heat Injury and Illness Prevention Standard by Provision for Very Small Entities (2023$)

Provision	One-Time	Periodic Costs Annualized		Annual	Costs Savings	Total Annualized [a]	
		0%	2%			0%	2%
Rule Familiarization	$114,091,454	$0	$0	$0	$0	$11,409,145	$12,701,405
Heat Injury and Illness Prevention Plan	$722,235,085	$0	$0	$129,326,342	$0	$201,549,851	$209,730,267
Identifying Heat Hazards	$48,640,027	$188,281,796	$175,889,421	$254,469,418	$0	$278,161,601	$279,465,502

Table VIII.F.3. Total Costs of the Proposed Heat Injury and Illness Prevention Standard by Provision for Very Small Entities (2023$)

Provision	One-Time	Periodic Costs Annualized		Annual	Costs Savings	Total Annualized [a]	
		0%	2%			0%	2%
Requirements at or above the Initial Heat Trigger	$123,616,262	$0	$0	$252,006,494	$13,475,322	$250,892,798	$252,292,941
Requirements at or above the High Heat Trigger	$2,654,923	$0	$0	$2,476,140,705	$1,705,554,474	$770,851,723	$770,881,794
Heat Illness and Emergency Response and Planning	$192,369,277	$0	$0	$433,352,739	$0	$452,589,667	$454,768,543
Training	$609,255,824	$0	$0	$129,732,988	$0	$190,658,570	$197,559,323
Total	**$1,812,663,317**	**$188,281,796**	**$175,889,421**	**$3,682,138,934**	**$1,719,029,797**	**$2,163,203,649**	**$2,184,487,809**

Source: OSHA.

[a] The total costs with cost savings accounts for the potential labor productivity loss avoided by having more efficient and effective rest breaks required by the proposed standard than are currently taken.

Table VIII.F.4. presents the average costs per small entity, while Table VIII.F.5. presents the average costs per very small entity. On average, nearly 2.0 million small entities are estimated to incur costs of $1,950 annually to comply with the proposed standard. Fishing (NAICS 1141) are estimated to have the lowest costs of compliance of the covered small entities—$461 on average annually to comply with the proposed rule. The small entities with the largest costs, Psychiatric and Substance Abuse Hospitals (NAICS 6222), would spend an estimated $118,974 annually to comply with the proposed standard.

On average, about 1.8 million very small entities are estimated to incur costs of $1,182 annually to comply with the proposed standard. The smallest average costs per very small entity are incurred by Fishing (NAICS 1141)—estimated to be $459 on average annually to comply with the proposed standard. The highest average costs for very small establishments are incurred by Specialty (except Psychiatric and Substance Abuse) Hospitals (NAICS 6223) and are estimated to be about $45,066 annually.

The potential small entity impacts of the proposed rule were derived based on the methodology detailed in Section VIII.D., Economic Feasibility. Table VIII.F.5. shows that, while small entities in most industries are estimated to have costs that are well below one percent of revenue, a few are estimated to experience costs that exceed one percent of revenues. Costs as a percentage of revenues for these entities vary from less than 0.01 percent for Tobacco Manufacturing (NAICS 3122) and Petroleum and Coal Products Manufacturing (NAICS 3241) to 2.84 percent for Child Care Services (NAICS 6244).

Note that the costs in these tables were annualized using a 2 percent discount rate. The impacts for very small entities can be seen in Table VIII.F.6.

As with the small entity impact analysis, the very small entity impact analysis shows that, in the majority of industries, the average impacts per entity are well below the one percent threshold. Impacts range from 0.01 percent for a few industries such as Petroleum and Coal Products Manufacturing (NAICS 3241), and Motor Vehicle.

As discussed in depth in Section VIII.D., the agency believes some of the estimated impact in some of these industries is likely overstated, due to inflexibility in the cost analysis regarding the amount of time spent outside in heat in a nondiscretionary manner. For example, even if the assumption that these employees spend a large percentage of their time outside is realistic under normal circumstances, childcare providers and in-person health care providers would likely limit their time outside in high heat situations if only to protect those in their care. If the costs of complying with this proposed standard were onerous, limiting employee exposure to the outdoors during times of extreme heat would be a costless method to comply with the standard and could possibly result in these employers being fully exempt from the standard (e.g., if the employer limited employee's outdoor exposure to meet the exemption for short duration employee exposure). OSHA's cost estimates did not take changes in employee scheduling into account and therefore may have overestimated costs to employers whose employees have discretion regarding the amount of time they spend outside.

NAICS 1124 Sheep and Goat Farming and NAICS 1129 Other Animal Production are both heavily weighted to very small family-owned farms (USDA, 2019).

Due to a Congressional budget rider, OSHA is not able to expend funds on enforcement activities for small farms. Only about 5 percent of sheep and goat farms and 12 percent of combined Other Animal Production and Aquaculture are something other than family-owned farms (i.e., partnerships or corporations). (Given the economies of scale necessary for aquaculture, it's likely that these account for more of the corporate farms in the combined Other Animal Production and Aquaculture data meaning more farms in NAICS 1129 may be family-owned farms than appear to be in the combined data.) Based on the Census of Agriculture, about 20,000 of about 79,000 total sheep and goat farms have hired labor and those have 2 hired laborers on average. For other animal production and aquaculture combined, about 35,000 farms out of about 190,000 total farms report having hired labor and have an average of 3.5 hire laborers. Based on the size and organization of these farms, it is unlikely OSHA would be enforcing this standard on those industries so they would not incur compliance costs. OSHA welcomes feedback on this analysis of the impact on small and very small entities

The costs of this proposed standard are largely employee-based and the agency has not found there to be feasibility concerns for entities of any size. Therefore, the agency believes that including large non-profits in the profile of SBA/RFA defined small entities would not alter the findings of the Initial Regulatory Flexibility Analysis. OSHA welcomes comment regarding the inclusion of large non-profits in the profile of SBA/RFA defined small entities.

Table VIII.F.4. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
1111	Oilseed and Grain Farming	12,511	$13,585,428	$1,086	$759,359	0.14%
1112	Vegetable and Melon Farming	2,127	$9,980,549	$4,693	$1,153,664	0.41%
1113	Fruit and Tree Nut Farming	6,121	$14,284,547	$2,334	$682,745	0.34%
1114	Greenhouse, Nursery, and Floriculture Production	2,720	$12,359,299	$4,544	$741,146	0.61%
1119	Other Crop Farming	9,564	$15,497,239	$1,620	$282,465	0.57%
1121	Cattle Ranching and Farming	18,428	$28,781,484	$1,562	$700,078	0.22%
1122	Hog and Pig Farming	1,048	$2,182,612	$2,082	$2,601,611	0.08%
1123	Poultry and Egg Production	2,278	$4,700,946	$2,064	$2,939,009	0.07%
1124	Sheep and Goat Farming	1,548	$2,393,222	$1,546	$88,910	1.74%
1125	Aquaculture	160	$616,482	$3,859	$1,133,734	0.34%
1129	Other Animal Production	4,913	$7,999,112	$1,628	$115,067	1.41%
1131	Timber Tract Operations	442	$439,946	$996	$1,501,147	0.07%
1132	Forest Nurseries and Gathering of Forest Products	150	$152,566	$1,017	$790,399	0.13%
1133	Logging	7,980	$7,648,751	$958	$1,563,286	0.06%
1141	Fishing	2,432	$1,113,045	$458	$853,204	0.05%
1142	Hunting and Trapping	351	$374,292	$1,066	$799,221	0.13%
1151	Support Activities for Crop Production	4,648	$5,853,520	$1,259	$2,707,767	0.05%
1152	Support Activities for Animal Production	4,640	$3,376,198	$728	$506,802	0.14%
1153	Support Activities for Forestry	1,658	$1,398,749	$844	$1,111,045	0.08%
2111	Oil and Gas Extraction	5,307	$16,476,736	$3,105	$26,579,145	0.01%
2131	Support Activities for Mining	10,921	$43,981,568	$4,027	$3,821,423	0.11%
2211	Electric Power Generation, Transmission and Distribution	2,058	$28,171,559	$13,690	$76,221,412	0.02%
2212	Natural Gas Distribution	418	$3,527,573	$8,436	$70,106,856	0.01%
2213	Water, Sewage and Other Systems	3,668	$7,573,926	$2,065	$1,410,992	0.15%
2361	Residential Building Construction	171,099	$106,947,179	$625	$1,421,852	0.04%

Table VIII.F.4. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
2362	Nonresidential Building Construction	40,735	$62,520,995	$1,535	$6,719,320	0.02%
2371	Utility System Construction	16,774	$34,191,049	$2,038	$3,633,655	0.06%
2372	Land Subdivision	4,805	$3,170,977	$660	$1,877,172	0.04%
2373	Highway, Street, and Bridge Construction	8,285	$17,087,777	$2,062	$6,724,608	0.03%
2379	Other Heavy and Civil Engineering Construction	4,056	$6,569,839	$1,620	$3,024,764	0.05%
2381	Foundation, Structure, and Building Exterior Contractors	91,279	$125,277,109	$1,372	$1,699,487	0.08%
2382	Building Equipment Contractors	177,612	$233,824,679	$1,316	$1,621,258	0.08%
2383	Building Finishing Contractors	114,496	$106,453,318	$930	$1,078,107	0.09%
2389	Other Specialty Trade Contractors	68,126	$72,672,079	$1,067	$1,929,027	0.06%
3111	Animal Food Manufacturing	636	$1,601,425	$2,520	$24,357,224	0.01%
3112	Grain and Oilseed Milling	250	$1,211,561	$4,854	$62,037,403	0.01%
3113	Sugar and Confectionery Product Manufacturing	868	$2,204,453	$2,539	$9,556,299	0.03%
3114	Fruit and Vegetable Preserving and Specialty Food Manufacturing	743	$3,725,663	$5,016	$25,690,434	0.02%
3115	Dairy Product Manufacturing	588	$2,637,411	$4,484	$49,929,979	0.01%
3116	Animal Slaughtering and Processing	1,456	$12,280,924	$8,438	$38,292,294	0.02%
3117	Seafood Product Preparation and Packaging	221	$902,567	$4,087	$22,008,470	0.02%
3118	Bakeries and Tortilla Manufacturing	5,471	$11,517,147	$2,105	$3,818,211	0.06%
3119	Other Food Manufacturing	1,655	$5,268,917	$3,183	$16,374,321	0.02%
3121	Beverage Manufacturing	4,226	$6,542,557	$1,548	$8,758,819	0.02%
3122	Tobacco Manufacturing	58	$515,881	$8,848	$182,294,825	0.00%
3131	Fiber, Yarn, and Thread Mills	102	$1,037,014	$10,139	$19,374,286	0.05%
3132	Fabric Mills	345	$1,937,288	$5,609	$12,945,642	0.04%
3133	Textile and Fabric Finishing and Fabric Coating Mills	378	$1,346,267	$3,565	$7,871,921	0.05%

Table VIII.F.4. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3141	Textile Furnishings Mills	769	$2,410,151	$3,134	$5,547,861	0.06%
3149	Other Textile Product Mills	1,981	$2,870,758	$1,449	$2,012,712	0.07%
3152	Cut and Sew Apparel Manufacturing	1,485	$1,708,817	$1,151	$907,132	0.13%
3159	Apparel Accessories and Other Apparel Manufacturing	279	$488,329	$1,750	$1,772,440	0.10%
3161	Leather and Hide Tanning and Finishing	75	$78,767	$1,048	$6,384,614	0.02%
3162	Footwear Manufacturing	102	$410,499	$4,029	$5,074,485	0.08%
3211	Sawmills and Wood Preservation	1,425	$5,001,937	$3,510	$7,582,835	0.05%
3212	Veneer, Plywood, and Engineered Wood Product Manufacturing	169	$1,273,144	$7,533	$21,682,868	0.03%
3219	Other Wood Product Manufacturing	4,412	$11,586,726	$2,626	$4,072,371	0.06%
3221	Pulp, Paper, and Paperboard Mills	35	$855,082	$24,193	$136,863,576	0.02%
3222	Converted Paper Product Manufacturing	1,264	$6,774,484	$5,360	$24,890,031	0.02%
3231	Printing and Related Support Activities	12,027	$11,573,349	$962	$2,522,782	0.04%
3241	Petroleum and Coal Products Manufacturing	464	$3,199,326	$6,895	$177,980,216	0.00%
3251	Basic Chemical Manufacturing	642	$4,655,288	$7,251	$78,530,261	0.01%
3252	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	530	$4,077,855	$7,695	$52,682,176	0.01%
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	355	$1,140,904	$3,217	$18,940,264	0.02%
3254	Pharmaceutical and Medicine Manufacturing	925	$5,779,821	$6,251	$51,766,648	0.01%
3255	Paint, Coating, and Adhesive Manufacturing	705	$2,479,397	$3,516	$16,249,794	0.02%
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing	1,002	$3,477,371	$3,470	$17,908,986	0.02%

Table VIII.F.4. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3259	Other Chemical Product and Preparation Manufacturing	872	$2,542,871	$2,916	$12,165,378	0.02%
3261	Plastics Product Manufacturing	4,134	$19,980,060	$4,833	$13,921,131	0.03%
3262	Rubber Product Manufacturing	699	$3,192,709	$4,565	$12,772,546	0.04%
3271	Clay Product and Refractory Manufacturing	463	$1,199,726	$2,590	$5,587,274	0.05%
3272	Glass and Glass Product Manufacturing	706	$1,989,379	$2,819	$6,976,531	0.04%
3273	Cement and Concrete Product Manufacturing	2,173	$8,394,899	$3,863	$8,676,117	0.04%
3274	Lime and Gypsum Product Manufacturing	74	$303,318	$4,126	$15,209,592	0.03%
3279	Other Nonmetallic Mineral Product Manufacturing	1,369	$3,198,469	$2,336	$5,186,460	0.05%
3311	Iron and Steel Mills and Ferroalloy Manufacturing	191	$2,633,059	$13,753	$115,596,140	0.01%
3312	Steel Product Manufacturing from Purchased Steel	246	$1,720,852	$6,991	$28,374,263	0.02%
3313	Alumina and Aluminum Production and Processing	155	$1,282,335	$8,290	$35,439,130	0.02%
3314	Nonferrous Metal (except Aluminum) Production and Processing	309	$1,616,110	$5,227	$39,316,152	0.01%
3315	Foundries	691	$2,989,596	$4,329	$11,281,321	0.04%
3321	Forging and Stamping	991	$2,784,200	$2,810	$10,193,180	0.03%
3322	Cutlery and Handtool Manufacturing	529	$928,777	$1,755	$5,517,119	0.03%
3323	Architectural and Structural Metals Manufacturing	5,974	$16,517,707	$2,765	$5,735,883	0.05%
3324	Boiler, Tank, and Shipping Container Manufacturing	589	$2,689,023	$4,567	$12,577,513	0.04%
3325	Hardware Manufacturing	272	$770,518	$2,836	$8,866,155	0.03%

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NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3326	Spring and Wire Product Manufacturing	492	$1,152,112	$2,340	$6,269,990	0.04%
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	11,032	$15,208,419	$1,379	$2,901,748	0.05%
3328	Coating, Engraving, Heat Treating, and Allied Activities	2,521	$5,835,961	$2,315	$4,178,955	0.06%
3329	Other Fabricated Metal Product Manufacturing	2,806	$7,766,243	$2,767	$7,493,462	0.04%
3331	Agriculture, Construction, and Mining Machinery Manufacturing	1,247	$5,944,680	$4,766	$18,417,556	0.03%
3332	Industrial Machinery Manufacturing	425	$1,030,865	$2,425	$10,195,646	0.02%
3334	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing	699	$3,921,041	$5,609	$15,601,508	0.04%
3335	Metalworking Machinery Manufacturing	3,010	$4,202,594	$1,396	$4,357,322	0.03%
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	337	$1,582,741	$4,698	$25,365,617	0.02%
3339	Other General Purpose Machinery Manufacturing	1,762	$5,979,770	$3,394	$12,034,903	0.03%
3341	Computer and Peripheral Equipment Manufacturing	415	$490,089	$1,182	$8,911,705	0.01%
3342	Communications Equipment Manufacturing	547	$1,256,142	$2,294	$13,522,113	0.02%
3343	Audio and Video Equipment Manufacturing	219	$262,564	$1,198	$5,604,208	0.02%
3344	Semiconductor and Other Electronic Component Manufacturing	1,680	$4,552,187	$2,709	$13,079,398	0.02%
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	2,157	$4,626,878	$2,145	$12,820,769	0.02%

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Table VIII.F.4. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3352	Household Appliance Manufacturing	101	$332,021	$3,290	$14,304,913	0.02%
3353	Electrical Equipment Manufacturing	852	$2,906,501	$3,411	$10,715,020	0.03%
3359	Other Electrical Equipment and Component Manufacturing	752	$2,497,573	$3,319	$12,404,672	0.03%
3361	Motor Vehicle Manufacturing	23	$51,856	$2,260	$58,221,416	0.00%
3362	Motor Vehicle Body and Trailer Manufacturing	803	$4,874,596	$6,071	$15,741,094	0.04%
3363	Motor Vehicle Parts Manufacturing	1,978	$13,487,337	$6,817	$32,394,740	0.02%
3364	Aerospace Product and Parts Manufacturing	646	$3,977,519	$6,160	$29,941,829	0.02%
3365	Railroad Rolling Stock Manufacturing	74	$567,108	$7,707	$33,655,605	0.02%
3366	Ship and Boat Building	658	$7,118,392	$10,818	$14,164,896	0.08%
3369	Other Transportation Equipment Manufacturing	392	$641,075	$1,635	$6,718,062	0.02%
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	4,766	$9,401,064	$1,972	$2,859,010	0.07%
3372	Office Furniture (including Fixtures) Manufacturing	1,690	$3,989,090	$2,360	$5,125,287	0.05%
3379	Other Furniture Related Product Manufacturing	326	$1,166,170	$3,581	$8,591,445	0.04%
3391	Medical Equipment and Supplies Manufacturing	4,621	$7,495,312	$1,622	$4,733,183	0.03%
3399	Other Miscellaneous Manufacturing	8,582	$11,161,673	$1,301	$2,660,648	0.05%
4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	1,544	$11,511,623	$7,456	$8,053,146	0.09%
4232	Furniture and Home Furnishing Merchant Wholesalers	1,077	$5,781,729	$5,367	$5,828,655	0.09%
4233	Lumber and Other Construction Materials Merchant Wholesalers	993	$5,631,821	$5,671	$6,885,143	0.08%

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NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	2,259	$10,168,859	$4,501	$5,929,082	0.08%
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	709	$4,763,004	$6,715	$13,288,617	0.05%
4236	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers	1,907	$11,364,290	$5,960	$8,540,329	0.07%
4237	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers	1,026	$5,820,745	$5,674	$6,361,789	0.09%
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	4,033	$29,834,160	$7,398	$5,737,517	0.13%
4239	Miscellaneous Durable Goods Merchant Wholesalers	2,831	$10,561,663	$3,731	$5,222,434	0.07%
4241	Paper and Paper Product Merchant Wholesalers	717	$3,784,639	$5,277	$5,821,550	0.09%
4242	Drugs and Druggists' Sundries Merchant Wholesalers	662	$4,340,575	$6,561	$10,574,055	0.06%
4243	Apparel, Piece Goods, and Notions Merchant Wholesalers	386	$1,344,807	$3,483	$5,167,182	0.07%
4244	Grocery and Related Product Merchant Wholesalers	2,662	$15,934,090	$5,986	$10,630,078	0.06%
4245	Farm Product Raw Material Merchant Wholesalers	325	$2,641,457	$8,119	$23,756,996	0.03%
4246	Chemical and Allied Products Merchant Wholesalers	809	$4,315,458	$5,336	$8,980,738	0.06%
4247	Petroleum and Petroleum Products Merchant Wholesalers	376	$3,206,820	$8,522	$61,864,570	0.01%
4248	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	326	$3,172,050	$9,724	$13,306,719	0.07%
4249	Miscellaneous Nondurable Goods Merchant Wholesalers	2,124	$10,353,521	$4,876	$5,895,079	0.08%

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Table VIII.F.4. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
4251	Wholesale Trade Agents and Brokers	3,749	$9,368,912	$2,499	$12,764,272	0.02%
4411	Automobile Dealers	6,500	$37,276,607	$5,735	$15,961,277	0.04%
4412	Other Motor Vehicle Dealers	955	$3,490,111	$3,656	$5,414,403	0.07%
4441	Building Material and Supplies Dealers	544	$1,021,683	$1,877	$2,831,193	0.07%
4451	Grocery and Convenience Retailers	6,886	$22,913,996	$3,328	$3,311,379	0.10%
4452	Specialty Food Retailers	1,180	$2,429,585	$2,059	$1,053,778	0.20%
4811	Scheduled Air Transportation	727	$10,339,037	$14,225	$97,899,634	0.01%
4812	Nonscheduled Air Transportation	1,637	$3,179,136	$1,942	$6,496,273	0.03%
4821	Rail Transportation	113	$78,448	$697	$1,132,927	0.06%
4831	Deep Sea, Coastal, and Great Lakes Water Transportation	606	$2,154,113	$3,553	$16,994,169	0.02%
4832	Inland Water Transportation	410	$1,791,814	$4,371	$6,386,189	0.07%
4841	General Freight Trucking	55,843	$50,365,637	$902	$1,458,914	0.06%
4842	Specialized Freight Trucking	39,386	$41,886,506	$1,063	$1,812,364	0.06%
4851	Urban Transit Systems	513	$590,618	$1,151	$2,151,325	0.05%
4852	Interurban and Rural Bus Transportation	488	$896,937	$1,837	$2,488,321	0.07%
4853	Taxi and Limousine Service	6,453	$7,243,177	$1,122	$862,937	0.13%
4854	School and Employee Bus Transportation	2,232	$3,191,204	$1,430	$2,019,525	0.07%
4855	Charter Bus Industry	978	$1,507,466	$1,541	$2,813,587	0.05%
4859	Other Transit and Ground Passenger Transportation	3,856	$3,185,344	$826	$1,343,491	0.06%
4861	Pipeline Transportation of Crude Oil	70	$347,281	$4,984	$28,045,336	0.02%
4862	Pipeline Transportation of Natural Gas	59	$90,847	$1,528	$15,269,599	0.01%
4869	Other Pipeline Transportation	71	$269,120	$3,788	$22,870,110	0.02%
4871	Scenic and Sightseeing Transportation, Land	572	$1,034,717	$1,808	$1,542,634	0.12%

Table VIII.F.4. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
4872	Scenic and Sightseeing Transportation, Water	1,479	$2,781,692	$1,881	$961,471	0.20%
4879	Scenic and Sightseeing Transportation, Other	229	$354,470	$1,551	$1,442,518	0.11%
4881	Support Activities for Air Transportation	3,639	$7,427,615	$2,041	$2,726,627	0.07%
4882	Support Activities for Rail Transportation	494	$1,414,555	$2,861	$3,694,856	0.08%
4883	Support Activities for Water Transportation	1,852	$6,207,901	$3,353	$4,619,864	0.07%
4884	Support Activities for Road Transportation	9,012	$6,993,625	$776	$1,019,225	0.08%
4885	Freight Transportation Arrangement	12,925	$18,974,056	$1,468	$2,467,206	0.06%
4889	Other Support Activities for Transportation	1,387	$1,669,460	$1,203	$1,765,588	0.07%
4921	Couriers and Express Delivery Services	3,724	$12,926,412	$3,471	$9,170,589	0.04%
4922	Local Messengers and Local Delivery	3,431	$3,012,249	$878	$1,312,866	0.07%
4931	Warehousing and Storage	9,681	$56,004,514	$5,785	$3,692,460	0.16%
5121	Motion Picture and Video Industries	2,568	$7,638,794	$2,975	$1,544,741	0.19%
5122	Sound Recording Industries	466	$946,190	$2,032	$1,914,032	0.11%
5174	Satellite Telecommunications	46	$165,892	$3,602	$3,473,723	0.10%
5182	Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services	1,352	$3,731,170	$2,759	$2,821,642	0.10%
5221	Depository Credit Intermediation	1,562	$21,857,409	$13,995	$15,334,364	0.09%
5222	Nondepository Credit Intermediation	1,085	$3,521,500	$3,245	$2,825,317	0.11%
5223	Activities Related to Credit Intermediation	1,822	$4,068,120	$2,232	$1,274,881	0.18%
5232	Securities and Commodity Exchanges	1	$26,178	$39,745	$753,808,884	0.01%

Table VIII.F.4. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
5239	Other Financial Investment Activities	1,542	$3,322,810	$2,154	$3,014,962	0.07%
5241	Insurance Carriers	724	$7,767,572	$10,729	$64,751,762	0.02%
5242	Agencies, Brokerages, and Other Insurance Related Activities	18,002	$37,871,610	$2,104	$884,543	0.24%
5251	Insurance and Employee Benefit Funds	161	$187,816	$1,164	$860,458	0.14%
5259	Other Investment Pools and Funds	122	$253,899	$2,075	$1,915,830	0.11%
5311	Lessors of Real Estate	13,445	$32,370,835	$2,408	$1,498,519	0.16%
5312	Offices of Real Estate Agents and Brokers	14,553	$27,775,521	$1,909	$848,299	0.22%
5313	Activities Related to Real Estate	10,787	$33,316,314	$3,088	$865,500	0.36%
5321	Automotive Equipment Rental and Leasing	567	$2,987,344	$5,267	$2,647,455	0.20%
5322	Consumer Goods Rental	1,185	$5,301,598	$4,475	$1,093,599	0.41%
5323	General Rental Centers	318	$1,344,257	$4,222	$1,436,198	0.29%
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	1,171	$5,466,318	$4,667	$3,114,198	0.15%
5331	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	315	$671,532	$2,130	$3,900,891	0.05%
5411	Legal Services	23,897	$49,298,948	$2,063	$1,105,731	0.19%
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	15,652	$36,586,403	$2,338	$715,353	0.33%
5413	Architectural, Engineering, and Related Services	12,833	$75,874,312	$5,913	$1,482,804	0.40%
5414	Specialized Design Services	4,402	$11,949,232	$2,715	$783,080	0.35%
5415	Computer Systems Design and Related Services	16,220	$39,798,676	$2,454	$1,363,070	0.18%
5416	Management, Scientific, and Technical Consulting Services	22,491	$62,683,511	$2,787	$917,797	0.30%

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NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
5417	Scientific Research and Development Services	2,115	$15,224,604	$7,199	$5,734,418	0.13%
5418	Advertising, Public Relations, and Related Services	4,587	$16,632,694	$3,626	$1,610,062	0.23%
5419	Other Professional, Scientific, and Technical Services	8,774	$45,327,608	$5,166	$1,037,261	0.50%
5511	Management of Companies and Enterprises	932	$7,466,268	$8,009	$7,794,296	0.10%
5611	Office Administrative Services	4,204	$10,143,593	$2,413	$1,807,749	0.13%
5612	Facilities Support Services	296	$3,898,123	$13,148	$4,474,249	0.29%
5613	Employment Services	3,752	$42,559,048	$11,344	$2,963,924	0.38%
5614	Business Support Services	3,342	$5,943,802	$1,778	$1,306,752	0.14%
5615	Travel Arrangement and Reservation Services	1,972	$3,129,421	$1,587	$1,663,607	0.10%
5616	Investigation and Security Services	2,773	$25,002,454	$9,018	$1,245,244	0.72%
5617	Services to Buildings and Dwellings	26,019	$112,901,810	$4,339	$671,194	0.65%
5619	Other Support Services	2,399	$7,136,600	$2,975	$1,533,830	0.19%
5621	Waste Collection	1,078	$2,523,921	$2,342	$3,245,312	0.07%
5622	Waste Treatment and Disposal	181	$743,227	$4,112	$3,879,488	0.11%
5629	Remediation and Other Waste Management Services	1,259	$6,361,525	$5,055	$2,114,365	0.24%
6111	Elementary and Secondary Schools	2,856	$34,194,636	$11,975	$4,338,191	0.28%
6112	Junior Colleges	61	$567,155	$9,272	$7,096,235	0.13%
6113	Colleges, Universities, and Professional Schools	178	$641,408	$3,603	$3,148,365	0.11%
6114	Business Schools and Computer and Management Training	1,150	$2,051,773	$1,785	$1,184,543	0.15%
6115	Technical and Trade Schools	1,020	$3,125,752	$3,063	$1,475,233	0.21%
6116	Other Schools and Instruction	7,124	$15,777,099	$2,215	$471,098	0.47%
6117	Educational Support Services	1,184	$2,055,225	$1,736	$994,278	0.17%

Table VIII.F.4. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
6211	Offices of Physicians	7,538	$16,396,965	$2,175	$1,557,548	0.14%
6212	Offices of Dentists	5,517	$15,448,753	$2,800	$1,107,348	0.25%
6213	Offices of Other Health Practitioners	5,985	$13,236,859	$2,212	$610,067	0.36%
6214	Outpatient Care Centers	799	$6,631,683	$8,303	$3,531,393	0.24%
6215	Medical and Diagnostic Laboratories	326	$1,639,918	$5,023	$2,880,366	0.17%
6216	Home Health Care Services	1,021	$21,196,909	$20,756	$1,947,504	1.07%
6219	Other Ambulatory Health Care Services	290	$2,399,519	$8,280	$2,122,696	0.39%
6221	General Medical and Surgical Hospitals	58	$3,146,213	$54,588	$31,988,544	0.17%
6222	Psychiatric and Substance Abuse Hospitals	10	$1,136,474	$118,967	$26,840,059	0.44%
6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	6	$408,435	$64,547	$24,345,151	0.27%
6231	Nursing Care Facilities (Skilled Nursing Facilities)	377	$15,692,040	$41,623	$7,737,051	0.54%
6232	Residential Intellectual and Developmental Disability, Mental Health, and Substance Abuse Facilities	454	$12,424,041	$27,345	$2,746,969	1.00%
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	779	$13,425,442	$17,232	$2,104,725	0.82%
6239	Other Residential Care Facilities	136	$3,155,732	$23,216	$2,165,006	1.07%
6241	Individual and Family Services	2,496	$39,826,256	$15,956	$1,571,030	1.02%
6242	Community Food and Housing, and Emergency and Other Relief Services	480	$5,254,947	$10,949	$2,633,784	0.42%
6243	Vocational Rehabilitation Services	172	$4,469,310	$25,964	$2,335,393	1.11%
6244	Child Care Services	2,687	$51,565,482	$19,189	$676,561	2.84%
7111	Performing Arts Companies	4,679	$5,483,031	$1,172	$1,560,279	0.08%
7112	Spectator Sports	2,011	$2,409,683	$1,198	$2,328,568	0.05%

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NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
7113	Promoters of Performing Arts, Sports, and Similar Events	4,046	$5,398,753	$1,334	$2,099,056	0.06%
7114	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures	2,119	$2,111,109	$996	$1,445,877	0.07%
7115	Independent Artists, Writers, and Performers	15,342	$14,460,165	$942	$835,413	0.11%
7121	Museums, Historical Sites, and Similar Institutions	3,845	$6,836,964	$1,778	$2,394,793	0.07%
7131	Amusement Parks and Arcades	1,742	$3,288,557	$1,888	$1,040,189	0.18%
7132	Gambling Industries	1,000	$2,273,300	$2,272	$5,012,918	0.05%
7139	Other Amusement and Recreation Industries	34,659	$51,264,046	$1,479	$1,051,729	0.14%
7211	Traveler Accommodation	17,375	$32,853,003	$1,891	$2,184,689	0.09%
7212	RV (Recreational Vehicle) Parks and Recreational Camps	2,543	$2,405,045	$946	$991,813	0.10%
7213	Rooming and Boarding Houses, Dormitories, and Workers' Camps	687	$741,076	$1,079	$930,215	0.12%
7223	Special Food Services	7,295	$8,312,585	$1,139	$857,031	0.13%
7224	Drinking Places (Alcoholic Beverages)	14,383	$13,061,680	$908	$663,521	0.14%
7225	Restaurants and Other Eating Places	157,253	$276,972,590	$1,761	$1,144,923	0.15%
8111	Automotive Repair and Maintenance	62,789	$100,273,474	$1,597	$798,630	0.20%
8113	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	8,982	$14,997,313	$1,670	$1,261,858	0.13%
8114	Personal and Household Goods Repair and Maintenance	9,417	$11,449,589	$1,216	$455,661	0.27%
8121	Personal Care Services	52,932	$64,529,881	$1,219	$346,123	0.35%
8122	Death Care Services	6,955	$13,214,986	$1,900	$1,130,650	0.17%

Table VIII.F.4. Economic Impacts on Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
8123	Drycleaning and Laundry Services	13,051	$16,733,433	$1,282	$564,862	0.23%
8129	Other Personal Services	16,792	$22,209,398	$1,323	$509,230	0.26%
8131	Religious Organizations	83,837	$126,171,312	$1,505	$722,894	0.21%
8132	Grantmaking and Giving Services	7,839	$8,889,289	$1,134	$3,473,007	0.03%
8133	Social Advocacy Organizations	6,903	$8,993,435	$1,303	$1,442,084	0.09%
8134	Civic and Social Organizations	11,030	$15,706,906	$1,424	$697,379	0.20%
8139	Business, Professional, Labor, Political, and Similar Organizations	25,710	$33,664,444	$1,309	$1,384,987	0.09%
9993	Local Government	4,846	$132,114,558	$27,261	$17,292,921	0.16%
Total		**1,985,235**	**$3,863,384,856**	**$1,946**	**$2,403,819**	**0.08%**

Source: OSHA.

Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
1111	Oilseed and Grain Farming	7,184	$6,027,437	$839	$609,184	0.14%
1112	Vegetable and Melon Farming	1,227	$3,233,900	$2,636	$705,291	0.37%
1113	Fruit and Tree Nut Farming	3,060	$4,119,361	$1,346	$384,931	0.35%
1114	Greenhouse, Nursery, and Floriculture Production	1,545	$4,149,308	$2,686	$513,448	0.52%
1119	Other Crop Farming	5,537	$6,434,964	$1,162	$198,860	0.58%
1121	Cattle Ranching and Farming	10,474	$11,742,592	$1,121	$523,461	0.21%
1122	Hog and Pig Farming	585	$921,175	$1,575	$2,022,974	0.08%
1123	Poultry and Egg Production	1,356	$2,018,022	$1,488	$2,264,037	0.07%
1124	Sheep and Goat Farming	856	$968,612	$1,131	$59,994	1.89%
1125	Aquaculture	91	$239,911	$2,630	$875,290	0.30%
1129	Other Animal Production	2,806	$3,272,814	$1,166	$88,841	1.31%

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Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
1131	Timber Tract Operations	429	$403,940	$942	$1,293,445	0.07%
1132	Forest Nurseries and Gathering of Forest Products	144	$104,419	$725	$679,386	0.11%
1133	Logging	7,530	$6,292,246	$836	$1,170,494	0.07%
1141	Fishing	2,416	$1,100,212	$455	$667,346	0.07%
1142	Hunting and Trapping	331	$292,626	$885	$619,029	0.14%
1151	Support Activities for Crop Production	4,102	$3,213,003	$783	$1,530,220	0.05%
1152	Support Activities for Animal Production	4,531	$2,962,939	$654	$405,439	0.16%
1153	Support Activities for Forestry	1,534	$1,037,673	$676	$765,904	0.09%
2111	Oil and Gas Extraction	4,571	$6,341,178	$1,387	$2,574,156	0.05%
2131	Support Activities for Mining	8,845	$14,462,495	$1,635	$937,066	0.17%
2211	Electric Power Generation, Transmission and Distribution	832	$2,254,730	$2,709	$13,316,386	0.02%
2212	Natural Gas Distribution	267	$546,792	$2,049	$10,690,728	0.02%
2213	Water, Sewage and Other Systems	3,468	$5,937,995	$1,712	$850,747	0.20%
2361	Residential Building Construction	167,394	$90,561,837	$541	$1,043,976	0.05%
2362	Nonresidential Building Construction	34,810	$32,498,908	$934	$2,948,013	0.03%
2371	Utility System Construction	13,929	$14,564,718	$1,046	$1,657,874	0.06%
2372	Land Subdivision	4,615	$2,626,758	$569	$1,167,179	0.05%
2373	Highway, Street, and Bridge Construction	6,251	$5,486,633	$878	$2,619,746	0.03%
2379	Other Heavy and Civil Engineering Construction	3,581	$3,418,173	$954	$1,444,677	0.07%
2381	Foundation, Structure, and Building Exterior Contractors	83,470	$72,226,262	$865	$936,942	0.09%
2382	Building Equipment Contractors	161,684	$141,354,524	$874	$847,521	0.10%
2383	Building Finishing Contractors	108,028	$74,449,281	$689	$653,438	0.11%

Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
2389	Other Specialty Trade Contractors	62,342	$43,480,559	$697	$1,039,609	0.07%
3111	Animal Food Manufacturing	377	$349,776	$928	$5,316,620	0.02%
3112	Grain and Oilseed Milling	130	$273,983	$2,115	$22,940,721	0.01%
3113	Sugar and Confectionery Product Manufacturing	652	$541,708	$831	$1,163,232	0.07%
3114	Fruit and Vegetable Preserving and Specialty Food Manufacturing	441	$532,718	$1,207	$3,760,308	0.03%
3115	Dairy Product Manufacturing	337	$456,581	$1,353	$9,285,097	0.01%
3116	Animal Slaughtering and Processing	996	$872,620	$876	$2,401,951	0.04%
3117	Seafood Product Preparation and Packaging	129	$107,828	$838	$3,136,053	0.03%
3118	Bakeries and Tortilla Manufacturing	4,379	$4,017,779	$918	$635,675	0.14%
3119	Other Food Manufacturing	1,111	$1,075,034	$968	$2,724,529	0.04%
3121	Beverage Manufacturing	3,429	$2,263,370	$660	$1,398,536	0.05%
3122	Tobacco Manufacturing	32	$42,411	$1,311	$6,587,893	0.02%
3131	Fiber, Yarn, and Thread Mills	60	$75,096	$1,254	$2,191,371	0.06%
3132	Fabric Mills	192	$233,984	$1,217	$3,435,732	0.04%
3133	Textile and Fabric Finishing and Fabric Coating Mills	263	$271,517	$1,031	$1,915,018	0.05%
3141	Textile Furnishings Mills	630	$573,335	$910	$780,741	0.12%
3149	Other Textile Product Mills	1,705	$1,270,778	$745	$614,109	0.12%
3151	Apparel Knitting Mills	54	$66,320	$1,228	$1,443,320	0.09%
3152	Cut and Sew Apparel Manufacturing	2,095	$1,429,596	$682	$637,842	0.11%
3159	Apparel Accessories and Other Apparel Manufacturing	236	$188,102	$796	$619,537	0.13%
3161	Leather and Hide Tanning and Finishing	61	$42,671	$698	$2,839,687	0.02%
3162	Footwear Manufacturing	75	$123,351	$1,655	$2,193,374	0.08%

Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3169	Other Leather and Allied Product Manufacturing	302	$187,558	$621	$626,299	0.10%
3211	Sawmills and Wood Preservation	1,006	$1,185,132	$1,179	$1,727,380	0.07%
3212	Veneer, Plywood, and Engineered Wood Product Manufacturing	264	$633,617	$2,400	$4,044,768	0.06%
3219	Other Wood Product Manufacturing	3,327	$3,257,167	$979	$1,053,722	0.09%
3221	Pulp, Paper, and Paperboard Mills	27	$376,078	$13,794	$93,208,301	0.01%
3222	Converted Paper Product Manufacturing	559	$893,086	$1,597	$4,579,693	0.03%
3231	Printing and Related Support Activities	10,124	$5,790,603	$572	$693,094	0.08%
3241	Petroleum and Coal Products Manufacturing	244	$494,702	$2,027	$28,484,143	0.01%
3251	Basic Chemical Manufacturing	277	$556,651	$2,011	$21,892,698	0.01%
3252	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	226	$335,765	$1,485	$6,835,167	0.02%
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	229	$350,781	$1,534	$7,269,726	0.02%
3254	Pharmaceutical and Medicine Manufacturing	546	$603,519	$1,106	$3,960,913	0.03%
3255	Paint, Coating, and Adhesive Manufacturing	448	$542,317	$1,211	$3,140,147	0.04%
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing	704	$655,288	$931	$2,390,628	0.04%
3259	Other Chemical Product and Preparation Manufacturing	579	$723,101	$1,250	$3,072,599	0.04%
3261	Plastics Product Manufacturing	2,192	$2,911,100	$1,328	$2,782,966	0.05%
3262	Rubber Product Manufacturing	382	$557,177	$1,459	$2,487,702	0.06%
3271	Clay Product and Refractory Manufacturing	328	$323,850	$989	$1,473,179	0.07%

Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3272	Glass and Glass Product Manufacturing	539	$546,405	$1,014	$1,791,588	0.06%
3273	Cement and Concrete Product Manufacturing	1,336	$1,655,935	$1,240	$2,456,404	0.05%
3274	Lime and Gypsum Product Manufacturing	51	$122,726	$2,409	$7,351,270	0.03%
3279	Other Nonmetallic Mineral Product Manufacturing	1,006	$1,149,905	$1,143	$1,653,776	0.07%
3311	Iron and Steel Mills and Ferroalloy Manufacturing	103	$218,406	$2,121	$6,567,240	0.03%
3312	Steel Product Manufacturing from Purchased Steel	121	$265,350	$2,191	$7,339,261	0.03%
3313	Alumina and Aluminum Production and Processing	82	$262,328	$3,197	$12,497,676	0.03%
3314	Nonferrous Metal (except Aluminum) Production and Processing	178	$278,430	$1,566	$8,757,990	0.02%
3315	Foundries	391	$547,296	$1,398	$2,192,210	0.06%
3321	Forging and Stamping	556	$557,664	$1,003	$2,020,339	0.05%
3322	Cutlery and Handtool Manufacturing	373	$259,248	$695	$1,107,327	0.06%
3323	Architectural and Structural Metals Manufacturing	4,125	$4,085,887	$991	$1,456,833	0.07%
3324	Boiler, Tank, and Shipping Container Manufacturing	300	$423,339	$1,409	$3,917,337	0.04%
3325	Hardware Manufacturing	186	$153,954	$828	$1,511,537	0.05%
3326	Spring and Wire Product Manufacturing	298	$292,858	$983	$1,589,842	0.06%
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	8,812	$6,785,989	$770	$910,823	0.08%
3328	Coating, Engraving, Heat Treating, and Allied Activities	1,740	$1,753,611	$1,008	$985,271	0.10%

Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3329	Other Fabricated Metal Product Manufacturing	1,998	$2,026,136	$1,014	$1,910,855	0.05%
3331	Agriculture, Construction, and Mining Machinery Manufacturing	776	$880,986	$1,135	$2,303,225	0.05%
3332	Industrial Machinery Manufacturing	951	$827,287	$870	$1,790,885	0.05%
3333	Commercial and Service Industry Machinery Manufacturing	602	$467,902	$777	$1,741,883	0.04%
3334	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing	409	$485,787	$1,186	$2,390,594	0.05%
3335	Metalworking Machinery Manufacturing	2,174	$1,503,816	$692	$1,172,111	0.06%
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	186	$279,911	$1,504	$4,514,698	0.03%
3339	Other General Purpose Machinery Manufacturing	1,576	$1,782,884	$1,131	$2,828,012	0.04%
3341	Computer and Peripheral Equipment Manufacturing	317	$181,009	$570	$2,040,422	0.03%
3342	Communications Equipment Manufacturing	374	$275,245	$735	$2,213,015	0.03%
3343	Audio and Video Equipment Manufacturing	180	$98,831	$548	$1,509,740	0.04%
3344	Semiconductor and Other Electronic Component Manufacturing	991	$740,401	$747	$1,810,399	0.04%
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	1,411	$961,637	$682	$2,280,952	0.03%
3346	Manufacturing and Reproducing Magnetic and Optical Media	158	$80,247	$509	$869,333	0.06%

Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
3351	Electric Lighting Equipment Manufacturing	321	$290,904	$906	$2,228,223	0.04%
3352	Household Appliance Manufacturing	73	$67,216	$915	$1,907,392	0.05%
3353	Electrical Equipment Manufacturing	543	$585,477	$1,078	$2,265,967	0.05%
3359	Other Electrical Equipment and Component Manufacturing	530	$775,438	$1,462	$4,923,782	0.03%
3361	Motor Vehicle Manufacturing	72	$42,019	$586	$8,079,095	0.01%
3362	Motor Vehicle Body and Trailer Manufacturing	462	$571,401	$1,237	$2,128,388	0.06%
3363	Motor Vehicle Parts Manufacturing	1,140	$1,248,555	$1,096	$2,450,442	0.04%
3364	Aerospace Product and Parts Manufacturing	368	$569,759	$1,550	$4,750,992	0.03%
3365	Railroad Rolling Stock Manufacturing	32	$104,712	$3,303	$12,137,746	0.03%
3366	Ship and Boat Building	446	$605,519	$1,357	$1,347,324	0.10%
3369	Other Transportation Equipment Manufacturing	321	$258,348	$804	$1,487,253	0.05%
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	4,244	$3,437,887	$810	$718,130	0.11%
3372	Office Furniture (including Fixtures) Manufacturing	1,162	$1,046,524	$901	$1,149,394	0.08%
3379	Other Furniture Related Product Manufacturing	216	$288,388	$1,337	$2,340,433	0.06%
3391	Medical Equipment and Supplies Manufacturing	3,950	$2,735,349	$693	$758,887	0.09%
3399	Other Miscellaneous Manufacturing	7,399	$5,215,239	$705	$801,390	0.09%
4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	1,257	$4,993,354	$3,973	$3,303,747	0.12%
4232	Furniture and Home Furnishing Merchant Wholesalers	910	$3,110,498	$3,417	$2,854,446	0.12%

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Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
4233	Lumber and Other Construction Materials Merchant Wholesalers	785	$2,505,110	$3,193	$3,557,039	0.09%
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	1,916	$5,577,568	$2,912	$2,405,983	0.12%
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	556	$2,106,984	$3,790	$6,228,340	0.06%
4236	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers	1,576	$5,580,492	$3,542	$3,369,434	0.11%
4237	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers	816	$2,636,524	$3,230	$2,796,763	0.12%
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	3,312	$15,267,247	$4,610	$2,896,468	0.16%
4239	Miscellaneous Durable Goods Merchant Wholesalers	2,551	$6,358,104	$2,492	$2,832,277	0.09%
4241	Paper and Paper Product Merchant Wholesalers	610	$2,004,758	$3,287	$2,995,604	0.11%
4242	Drugs and Druggists' Sundries Merchant Wholesalers	563	$1,888,913	$3,356	$4,020,123	0.08%
4243	Apparel, Piece Goods, and Notions Merchant Wholesalers	1,248	$3,098,845	$2,483	$2,808,295	0.09%
4244	Grocery and Related Product Merchant Wholesalers	2,242	$7,359,247	$3,283	$4,893,717	0.07%
4245	Farm Product Raw Material Merchant Wholesalers	266	$1,240,969	$4,671	$11,316,686	0.04%
4246	Chemical and Allied Products Merchant Wholesalers	676	$2,375,082	$3,516	$5,030,093	0.07%
4247	Petroleum and Petroleum Products Merchant Wholesalers	263	$1,242,062	$4,718	$20,772,751	0.02%

Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
4248	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	243	$763,626	$3,147	$3,176,806	0.10%
4249	Miscellaneous Nondurable Goods Merchant Wholesalers	1,870	$6,010,140	$3,215	$2,900,974	0.11%
4251	Wholesale Trade Agents and Brokers	3,577	$7,395,194	$2,068	$8,758,811	0.02%
4411	Automobile Dealers	4,702	$9,420,631	$2,004	$3,255,236	0.06%
4412	Other Motor Vehicle Dealers	1,853	$4,518,777	$2,439	$2,697,277	0.09%
4413	Automotive Parts, Accessories, and Tire Retailers	4,859	$11,159,040	$2,297	$1,134,410	0.20%
4441	Building Material and Supplies Dealers	5,693	$7,059,545	$1,240	$1,614,974	0.08%
4442	Lawn and Garden Equipment and Supplies Retailers	2,502	$5,016,485	$2,005	$1,498,082	0.13%
4451	Grocery and Convenience Retailers	10,521	$16,794,972	$1,596	$1,054,320	0.15%
4452	Specialty Food Retailers	3,551	$5,729,397	$1,613	$900,891	0.18%
4453	Beer, Wine, and Liquor Retailers	5,163	$5,975,343	$1,157	$1,325,671	0.09%
4491	Furniture and Home Furnishings Retailers	6,010	$8,962,736	$1,491	$1,223,523	0.12%
4492	Electronics and Appliance Retailers	3,217	$4,908,069	$1,525	$1,030,417	0.15%
4551	Department Stores	148	$190,770	$1,287	$1,621,586	0.08%
4552	Warehouse Clubs, Supercenters, and Other General Merchandise Retailers	2,556	$3,419,681	$1,338	$842,471	0.16%
4561	Health and Personal Care Retailers	7,776	$9,533,570	$1,226	$1,791,759	0.07%
4571	Gasoline Stations	10,327	$15,498,593	$1,501	$2,804,858	0.05%
4572	Fuel Dealers	649	$1,060,755	$1,635	$2,693,189	0.06%
4581	Clothing and Clothing Accessories Retailers	5,967	$8,712,135	$1,460	$698,207	0.21%
4582	Shoe Retailers	1,010	$1,421,801	$1,408	$1,020,151	0.14%
4583	Jewelry, Luggage, and Leather Goods Retailers	2,976	$3,898,966	$1,310	$1,079,268	0.12%

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Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
4591	Sporting Goods, Hobby, and Musical Instrument Retailers	5,150	$7,074,290	$1,374	$864,136	0.16%
4592	Book Retailers and News Dealers	774	$988,633	$1,278	$744,295	0.17%
4593	Florists	2,213	$3,540,277	$1,600	$494,498	0.32%
4594	Office Supplies, Stationery, and Gift Retailers	3,317	$4,621,207	$1,393	$627,443	0.22%
4595	Used Merchandise Retailers	2,352	$3,240,613	$1,378	$608,402	0.23%
4599	Other Miscellaneous Retailers	5,911	$8,732,908	$1,477	$1,042,423	0.14%
4811	Scheduled Air Transportation	278	$293,355	$1,054	$3,080,504	0.03%
4812	Nonscheduled Air Transportation	1,285	$1,286,819	$1,001	$2,040,509	0.05%
4821	Rail Transportation	96	$51,361	$536	$399,619	0.13%
4831	Deep Sea, Coastal, and Great Lakes Water Transportation	455	$544,184	$1,196	$2,200,414	0.05%
4832	Inland Water Transportation	323	$453,643	$1,403	$1,350,810	0.10%
4841	General Freight Trucking	51,643	$37,499,799	$726	$861,013	0.08%
4842	Specialized Freight Trucking	35,020	$26,650,522	$761	$892,912	0.09%
4851	Urban Transit Systems	373	$312,637	$839	$839,880	0.10%
4852	Interurban and Rural Bus Transportation	332	$422,567	$1,274	$833,268	0.15%
4853	Taxi and Limousine Service	5,931	$6,596,898	$1,112	$473,725	0.23%
4854	School and Employee Bus Transportation	1,444	$1,578,496	$1,093	$381,438	0.29%
4855	Charter Bus Industry	663	$764,143	$1,152	$976,121	0.12%
4859	Other Transit and Ground Passenger Transportation	3,097	$2,381,262	$769	$514,988	0.15%
4861	Pipeline Transportation of Crude Oil	27	$34,499	$1,282	$5,687,521	0.02%
4862	Pipeline Transportation of Natural Gas	59	$90,847	$1,528	$15,269,599	0.01%
4869	Other Pipeline Transportation	29	$37,586	$1,288	$4,867,763	0.03%

Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
4871	Scenic and Sightseeing Transportation, Land	474	$570,363	$1,203	$670,486	0.18%
4872	Scenic and Sightseeing Transportation, Water	1,385	$2,109,958	$1,524	$589,761	0.26%
4879	Scenic and Sightseeing Transportation, Other	208	$272,900	$1,311	$812,572	0.16%
4881	Support Activities for Air Transportation	2,961	$3,481,748	$1,176	$1,058,641	0.11%
4882	Support Activities for Rail Transportation	315	$430,553	$1,366	$1,603,240	0.09%
4883	Support Activities for Water Transportation	1,396	$1,914,888	$1,372	$1,256,551	0.11%
4884	Support Activities for Road Transportation	8,222	$6,121,945	$745	$687,092	0.11%
4885	Freight Transportation Arrangement	11,283	$15,674,157	$1,389	$1,583,872	0.09%
4889	Other Support Activities for Transportation	1,202	$1,095,829	$912	$799,155	0.11%
4921	Couriers and Express Delivery Services	3,125	$2,811,195	$900	$843,986	0.11%
4922	Local Messengers and Local Delivery	2,990	$2,455,403	$821	$741,162	0.11%
4931	Warehousing and Storage	3,555	$3,599,514	$1,012	$1,301,304	0.08%
5121	Motion Picture and Video Industries	2,383	$4,673,631	$1,962	$903,851	0.22%
5122	Sound Recording Industries	445	$780,716	$1,754	$660,025	0.27%
5131	Newspaper, Periodical, Book, and Directory Publishers	1,936	$4,503,697	$2,326	$816,692	0.28%
5132	Software Publishers	1,057	$2,023,518	$1,915	$1,268,517	0.15%
5161	Radio and Television Broadcasting Stations	370	$1,470,235	$3,969	$662,207	0.60%
5162	Media Streaming Distribution Services, Social Networks, and Other	235	$560,991	$2,388	$1,346,479	0.18%

Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
	Media Networks and Content Providers					
5171	Wired and Wireless Telecommunications (except Satellite)	942	$1,900,994	$2,018	$1,249,302	0.16%
5174	Satellite Telecommunications	40	$86,847	$2,157	$1,745,466	0.12%
5178	All Other Telecommunications	287	$502,736	$1,753	$1,126,736	0.16%
5182	Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services	1,112	$2,196,650	$1,976	$1,171,961	0.17%
5192	Web Search Portals, Libraries, Archives, and Other Information Services	468	$867,704	$1,853	$507,510	0.37%
5221	Depository Credit Intermediation	637	$1,709,643	$2,682	$1,711,700	0.16%
5222	Nondepository Credit Intermediation	1,654	$3,919,691	$2,369	$1,191,143	0.20%
5223	Activities Related to Credit Intermediation	1,718	$3,212,716	$1,870	$758,941	0.25%
5231	Securities and Commodity Contracts Intermediation and Brokerage	1,349	$2,298,865	$1,704	$1,235,568	0.14%
5232	Securities and Commodity Exchanges	0	$19,633	$39,745	$753,808,884	0.01%
5239	Other Financial Investment Activities	6,852	$11,878,438	$1,734	$1,247,480	0.14%
5241	Insurance Carriers	499	$1,011,256	$2,025	$3,600,269	0.06%
5242	Agencies, Brokerages, and Other Insurance Related Activities	17,366	$34,184,872	$1,968	$575,155	0.34%
5251	Insurance and Employee Benefit Funds	197	$166,858	$849	$198,788	0.43%
5259	Other Investment Pools and Funds	112	$200,679	$1,786	$1,085,641	0.16%
5311	Lessors of Real Estate	12,961	$26,616,095	$2,054	$1,090,656	0.19%
5312	Offices of Real Estate Agents and Brokers	14,379	$25,261,103	$1,757	$700,221	0.25%
5313	Activities Related to Real Estate	10,077	$22,407,861	$2,224	$584,901	0.38%

Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
5321	Automotive Equipment Rental and Leasing	482	$1,447,641	$3,004	$1,018,247	0.29%
5322	Consumer Goods Rental	1,039	$3,003,692	$2,891	$609,218	0.47%
5323	General Rental Centers	284	$865,973	$3,049	$969,539	0.31%
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	949	$2,282,588	$2,404	$1,447,107	0.17%
5331	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	285	$476,238	$1,669	$3,054,162	0.05%
5411	Legal Services	22,852	$45,807,442	$2,005	$747,237	0.27%
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	14,754	$29,735,652	$2,015	$425,212	0.47%
5413	Architectural, Engineering, and Related Services	11,568	$42,680,149	$3,690	$796,165	0.46%
5414	Specialized Design Services	4,322	$10,844,535	$2,509	$651,156	0.39%
5415	Computer Systems Design and Related Services	15,074	$30,869,789	$2,048	$699,158	0.29%
5416	Management, Scientific, and Technical Consulting Services	21,484	$48,439,074	$2,255	$605,529	0.37%
5417	Scientific Research and Development Services	1,662	$4,503,806	$2,709	$1,184,901	0.23%
5418	Advertising, Public Relations, and Related Services	4,240	$11,597,282	$2,735	$972,915	0.28%
5419	Other Professional, Scientific, and Technical Services	8,042	$31,055,715	$3,862	$718,191	0.54%
5511	Management of Companies and Enterprises	622	$1,694,619	$2,724	$2,000,475	0.14%
5611	Office Administrative Services	3,518	$5,423,804	$1,542	$785,494	0.20%
5612	Facilities Support Services	157	$441,128	$2,817	$1,344,810	0.21%
5613	Employment Services	2,522	$4,435,122	$1,758	$862,254	0.20%
5614	Business Support Services	2,939	$3,932,901	$1,338	$637,724	0.21%

Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
5615	Travel Arrangement and Reservation Services	1,846	$2,452,247	$1,328	$1,145,290	0.12%
5616	Investigation and Security Services	2,305	$7,402,537	$3,212	$568,222	0.57%
5617	Services to Buildings and Dwellings	24,202	$62,022,534	$2,563	$441,221	0.58%
5619	Other Support Services	2,194	$4,403,819	$2,007	$960,942	0.21%
5621	Waste Collection	893	$1,162,660	$1,301	$1,262,504	0.10%
5622	Waste Treatment and Disposal	140	$316,092	$2,251	$1,725,940	0.13%
5629	Remediation and Other Waste Management Services	1,086	$3,133,580	$2,885	$1,098,195	0.26%
6111	Elementary and Secondary Schools	1,169	$3,475,761	$2,973	$637,302	0.47%
6112	Junior Colleges	29	$111,992	$3,817	$2,336,262	0.16%
6113	Colleges, Universities, and Professional Schools	119	$231,971	$1,952	$1,512,355	0.13%
6114	Business Schools and Computer and Management Training	1,062	$1,591,435	$1,498	$755,854	0.20%
6115	Technical and Trade Schools	841	$1,646,426	$1,959	$687,422	0.28%
6116	Other Schools and Instruction	6,476	$11,488,813	$1,774	$332,175	0.53%
6117	Educational Support Services	1,096	$1,574,151	$1,437	$604,768	0.24%
6211	Offices of Physicians	6,908	$12,269,746	$1,776	$960,870	0.18%
6212	Offices of Dentists	5,290	$13,513,854	$2,555	$948,924	0.27%
6213	Offices of Other Health Practitioners	5,695	$10,110,019	$1,775	$447,256	0.40%
6214	Outpatient Care Centers	536	$1,544,461	$2,879	$989,325	0.29%
6215	Medical and Diagnostic Laboratories	265	$717,035	$2,703	$1,182,302	0.23%
6216	Home Health Care Services	653	$2,917,046	$4,468	$518,702	0.86%
6219	Other Ambulatory Health Care Services	209	$655,184	$3,137	$797,038	0.39%
6221	General Medical and Surgical Hospitals	4	$20,164	$5,297	$10,704,238	0.05%

Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
6222	Psychiatric and Substance Abuse Hospitals	1	$60,072	$40,967	$15,140,669	0.27%
6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	2	$89,129	$45,058	$23,112,360	0.19%
6231	Nursing Care Facilities (Skilled Nursing Facilities)	97	$299,181	$3,092	$1,138,055	0.27%
6232	Residential Intellectual and Developmental Disability, Mental Health, and Substance Abuse Facilities	246	$1,184,615	$4,820	$495,389	0.97%
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	523	$2,224,552	$4,252	$439,078	0.97%
6239	Other Residential Care Facilities	83	$513,007	$6,216	$469,247	1.32%
6241	Individual and Family Services	1,805	$7,386,994	$4,092	$424,361	0.96%
6242	Community Food and Housing, and Emergency and Other Relief Services	334	$1,555,480	$4,659	$990,632	0.47%
6243	Vocational Rehabilitation Services	81	$345,131	$4,262	$566,673	0.75%
6244	Child Care Services	2,132	$20,144,880	$9,448	$290,434	3.25%
7111	Performing Arts Companies	4,171	$4,129,821	$990	$787,860	0.13%
7112	Spectator Sports	1,794	$1,430,879	$797	$1,258,295	0.06%
7113	Promoters of Performing Arts, Sports, and Similar Events	3,604	$3,665,186	$1,017	$1,122,492	0.09%
7114	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures	2,047	$2,033,576	$993	$1,093,566	0.09%
7115	Independent Artists, Writers, and Performers	15,202	$14,251,524	$937	$787,943	0.12%
7121	Museums, Historical Sites, and Similar Institutions	3,149	$3,311,160	$1,051	$608,424	0.17%
7131	Amusement Parks and Arcades	1,354	$1,316,414	$972	$516,918	0.19%

Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
7132	Gambling Industries	744	$922,020	$1,239	$1,354,532	0.09%
7139	Other Amusement and Recreation Industries	28,297	$22,821,999	$807	$483,584	0.17%
7211	Traveler Accommodation	12,993	$15,574,139	$1,199	$877,297	0.14%
7212	RV (Recreational Vehicle) Parks and Recreational Camps	2,293	$1,620,981	$707	$721,900	0.10%
7213	Rooming and Boarding Houses, Dormitories, and Workers' Camps	654	$651,616	$996	$650,782	0.15%
7223	Special Food Services	6,293	$4,826,527	$767	$453,753	0.17%
7224	Drinking Places (Alcoholic Beverages)	12,801	$9,231,321	$721	$450,393	0.16%
7225	Restaurants and Other Eating Places	117,267	$109,738,307	$936	$537,890	0.17%
8111	Automotive Repair and Maintenance	64,015	$85,582,777	$1,337	$646,006	0.21%
8112	Electronic and Precision Equipment Repair and Maintenance	4,843	$7,081,340	$1,462	$555,490	0.26%
8113	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	8,375	$11,158,572	$1,332	$842,857	0.16%
8114	Personal and Household Goods Repair and Maintenance	9,205	$10,159,719	$1,104	$380,439	0.29%
8121	Personal Care Services	50,363	$59,103,771	$1,174	$267,441	0.44%
8122	Death Care Services	6,418	$9,445,610	$1,472	$854,725	0.17%
8123	Drycleaning and Laundry Services	12,190	$12,520,561	$1,027	$353,835	0.29%
8129	Other Personal Services	15,818	$15,920,372	$1,006	$339,338	0.30%
8131	Religious Organizations	76,718	$98,017,873	$1,278	$417,227	0.31%
8132	Grantmaking and Giving Services	7,573	$8,483,782	$1,120	$2,705,446	0.04%
8133	Social Advocacy Organizations	6,199	$6,958,994	$1,123	$816,788	0.14%
8134	Civic and Social Organizations	10,249	$12,512,391	$1,221	$479,271	0.25%

Table VIII.F.5. Economic Impacts on Very Small Entities Affected by the Proposed Standard with Costs Calculated Using a 2% Discount Rate

NAICS	Industry	Entities	Total Annualized Costs	Average Annualized Cost per Entity	Average Revenue per Entity	Costs as % of Revenue
8139	Business, Professional, Labor, Political, and Similar Organizations	23,841	$28,061,383	$1,177	$819,457	0.14%
9993	Local Government	1,922	$4,052,837	$2,109	$1,111,959	0.19%
Total		**1,847,745**	**$2,177,399,776**	**$1,178**	**$987,455**	**0.12%**

Source: OSHA.

F. Federal rules which may duplicate, overlap, or conflict with the proposed rule.

The Regulatory Flexibility Act (RFA) requires that the agency's initial regulatory flexibility Analysis identify, "to the extent practicable, ... all relevant Federal rules which may duplicate, overlap or conflict with the proposed rule" (5 USC 603(b)(5)). Below, OSHA discusses whether the rules it has identified would duplicate, overlap, or conflict with the options for a potential standard as outlined above. While some federal rules may have overlapping requirements, OSHA did not identify any rules that would conflict with the proposed standard. The agency therefore believes that no federal rules would prevent compliance with the proposed standard.

I. Other Federal Agency Rules.

The first federal rules that OSHA identified are regulations promulgated by the Environmental Protection Agency (EPA) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (7 USC 136 et seq). The Worker Protection Standard (WPS) (40 CFR Part 170) is designed to protect agricultural workers from "unreasonable adverse effects of pesticides" (80 FR 67496); however, there are some provisions of the WPS addressing heat hazards associated with PPE use required by that standard. The WPS requires that employers implement "appropriate" or "sufficient" measures to prevent heat-related illness when workers must wear PPE (40 CFR 170.507, 170.605). The WPS also requires employers to ensure pesticide handlers are trained on how to recognize, prevent, and provide first aid treatment for heat-related illnesses (40 CFR 170.501). Although there may be some overlap between these requirements and some elements of the proposed standard (e.g., training), OSHA is not aware of any conflicts. OSHA's proposed standard would be entirely consistent with EPA's requirements around PPE considerations and training for pesticide handlers. Additionally, the WPS, designed to protect workers from pesticide exposure, does not obviate the need for OSHA's proposed standard, designed to protect workers from hazardous heat. A multitude of factors, including PPE, can contribute to heat injury and illness.

The second set of federal rules that OSHA identified are Department of Transportation (DOT) regulations. The Federal Motor Carrier Safety Administration (FMCSA) requires drivers of vehicles with gross vehicle weight ratings of 26,001 pounds or more to be instructed about extreme driving conditions, including high heat, to obtain commercial driver's licenses (49 CFR Part 380). FMCSA's regulations might overlap with OSHA's proposed rule to the extent they require some training for a limited group of individuals. However, these regulations would not conflict with OSHA's proposed rule, nor do they obviate the need for a comprehensive OSHA standard with provisions specifically designed to protect workers exposed to a broad range of hazardous heat conditions.

II. OSHA Standards.

OSHA does not have any standards that specifically address workplace exposure to hazardous heat. However, OSHA has identified some current standards applicable to some issues related to hazardous heat. These standards, described below, do not conflict with the proposed rule, nor do they obviate the need for an OSHA standard addressing occupational exposure to hazardous heat.

The first set of standards OSHA identified are the sanitation standards (29 CFR 1910.141, 1926.51, 1915.88, 1917.127, 1918.95, 1928.110). Among other things, these standards require employers to provide employees with readily accessible potable drinking water and access to toilet facilities. The field sanitation standard for agriculture also requires employers to notify employees of the location of water and the importance of drinking water frequently, especially on hot days (29 CFR 1928.110(c)(4)). These existing standards and the provisions of the proposed rule do not conflict, nor do these existing standards obviate the need for a heat-specific standard. While OSHA's sanitation standards require employers to make drinking water available to employees, their primary purpose is to ensure sanitary conditions in the workplace and they do not include the same level of specificity for provision of water as the proposed standard (e.g., specific quantity of water to be provided).

The second set of standards OSHA has identified are specific to pulp and paper and textile mills. These standards require that exposed water pipes that carry either steam or hot water and are located close to working platforms be guarded to prevent contact (29 CFR 1910.261(k)(11), 1910.262). These standards are primarily concerned with burn and scalding-related hazards to employees. However, when employers guard these pipes by using insulating material, they may also help protect their workplace from increases in temperatures that may, in some cases, induce HRIs. Thus, the existing standards and the proposed standard would be complementary in nature.

The third set of standards that OSHA has identified are two broadly applicable standards that may apply to some heat-related hazards—the Recordkeeping standard (29

CFR 1904.7) and the Safety Training and Education standard for construction (29 CFR 1926.21). OSHA's Recordkeeping standard requires employers to record and report injuries and illnesses, including heat-related injuries and illnesses, that meet recording criteria. This proposed standard does not include additional requirements for recording and reporting injuries and illnesses and therefore does not duplicate or conflict with 29 CFR 1904.7. OSHA's Safety Training and Education standard requires employers in the construction industry to train employees in the recognition, avoidance, and prevention of unsafe conditions in their workplaces. However, the standard does not specifically identify hazardous heat as a hazard for which workers need training, nor does it establish heat-specific training requirements.

These standards might, in some cases, overlap with some of the provisions of the proposed standard. However, they do not duplicate or conflict with the proposed standard. OSHA believes that a comprehensive standard addressing HRIs is necessary to ensure that all employers take all appropriate measures to protect workers from the hazards associated with exposure to hazardous heat. If specific requirements of any final heat standard were to directly overlap with more general requirements in other existing standards, the specific requirements would apply in lieu of the more general requirements, unless otherwise noted (see 29 CFR 1910.5(c)(1); see also the discussion of the continued applicability of the sanitation standards in the *Explanation of Proposed Requirements* for paragraph (e)(2), Drinking Water).

G. Alternatives and Regulatory Options to the Proposed Rule.

This section presents regulatory alternatives and options to the proposed OSHA Heat Injury and Illness Prevention standard and OSHA's responses to the findings and recommendations of the SBAR panel.

Under the RFA, a regulatory alternative is one that would accomplish the stated objectives of the proposed standard and that would minimize or reduce economic impact of the proposed rule on small entities. A regulatory alternative can reduce the impact on businesses of all sizes, and it need not focus solely on small entities. OSHA also presents regulatory options. Regulatory options would increase the burden of compliance on affected entities and therefore do not meet the definition of a regulatory alternative set out in the RFA. Nevertheless, the agency presents them in this section to provide notice of potential alternate approaches and to solicit comment on these options. Table VIII.F.1. presents these options and alternatives. The assumptions and parameters for estimating the impact of these options and alternatives is discussed below the table.

OMB Circular A-4 (2023) directs agencies, for purposes of complying with E.O. 12866, to identify key attributes or provisions of a proposed standard and examine options for each "including: the proposed or finalized option; at least one option that achieves additional benefits (and presumably costs more due to, for example, greater stringency); and at least one option that costs less (and presumably generates fewer benefits due to, for example, less stringency)." For this proposed standard, OSHA identified requirements for rest breaks and for written HIIPPs as the key provisions for purposes of its E.O. 12866 analysis. The requirements of the proposed standard work in concert to produce the benefit of avoided HRIs and fatalities. The agency is unable to directly attribute avoided HRIs and fatalities to any specific provision so is unable to discuss the differences in the benefits of alternatives other than based on the assumption that more stringent options might increase benefits while less stringent alternatives might decrease benefits.

As shown in Table VIII.F.6. an option to require high heat triggered rest breaks every hour, is the costliest, incurring an additional $23.0 billion annually compared to the proposed requirement of rest breaks every two hours. The alternative that would reduce the compliance costs the most would be one that required 10-minute high heat triggered rest breaks (versus the 15-minute rest breaks required in the proposed standard), which results in approximately $3.2 billion less in compliance costs per year.

Table VIII.F.6. Costs for Regulatory Options and Alternatives (2023$)

Description	In-Scope Entities	In-Scope Establishments	In-Scope Employees	Annualized Costs (2%)	Difference
Proposed standard as written	2,230,750	2,535,774	35,954,325	$7,823,661,638	$0
Review HIIPP at least every other year instead of at least annually	2,230,750	2,535,774	35,954,325	$7,737,630,422	-$86,031,216
No written HIIPP required for < 20 employees instead of < 10 employees	2,230,750	2,535,774	35,954,325	$7,821,535,276	-$2,126,362
All establishments write HIIPP regardless of number of employees	2,230,750	2,535,774	35,954,325	$7,839,027,706	$15,366,068
At or above the high heat trigger, 15-minute rest break at least every hour instead of at least every two hours	2,230,750	2,535,774	35,954,325	$30,821,032,888	$22,997,371,249
At or above the high heat trigger, 10-minute rest break at least every two hours instead of 15-minute rest break at least every two hours	2,230,750	2,535,774	35,954,325	$4,601,335,411	-$3,222,326,227
Refresher trainings at least every other year instead of annually	2,230,750	2,535,774	35,954,325	$7,585,132,580	-$238,529,059
High heat trigger of 95° heat index instead of 90° heat index	2,230,750	2,535,774	35,954,325	$5,967,548,421	-$1,856,113,217
Acclimatization for employees returning after 30 days away from work, instead of after 14 days away from work	2,230,750	2,535,774	35,954,325	$7,822,809,795	-$851,843
Limit the sedentary work exemption to sedentary work activities at indoor work areas below [a heat index of 90°F]	2,230,750	2,535,774	35,954,325	$7,824,928,699	$1,267,060
Add a requirement for employers to provide medical surveillance	2,230,750	2,535,774	35,954,325	$10,301,080,493	$2,477,418,855

Source: OSHA.

I. Regulatory Options.

a. Regulatory Option 1 – All establishments write HIIPPs regardless of number of employees.

This alternative assumes that all establishments have their HIIPP in writing compared to the proposed standard where establishments with ten or fewer employees do not need to have their HIIPP in writing. All establishments with ten or fewer employees that do not have an existing HIIPP in place are modeled as either using OSHA's template (six hours of a designated person's labor time) or writing their HIIPP from scratch (30 hours) in the same proportions that were assumed for establishments of other sizes.

This regulatory option would add about $15.4 million in additional costs. OSHA believes that having a written plan is an important tool in protecting employees from heat and other workplace hazards. However, experience has shown that for the smallest employers, employees and supervisors or owners are working closely enough together that the details of safety plans can be readily communicated between individuals. The agency believes that written plans are not necessary for employers with 10 or fewer employees and that this is a useful way to reduce the burden on the smallest employers (although they would still need to have a HIIPP as required by this proposed standard).

b. Regulatory Option 2 – At or above the high heat trigger 15-minute rest break at least every hour.

The proposed standard would require employers to provide a 15-minute rest break at least every two hours when the high heat trigger is met. This option would require employers to instead provide a 15-minute rest break to their at-risk employees at least every hour where the high heat trigger is met. As such, the cost for rest breaks would be incurred six times during an 8-hour work shift where the high heat trigger is met (excluding rest breaks before lunch and at the end of the workday).

This option would add considerable costs to this proposed standard – nearly $23.0 billion. As discussed throughout this preamble, OSHA believes that rest breaks are a crucial tool to protect employees from heat injury and illness. As discussed in Section VII.F., Paragraph (f) Requirements at or above the High Heat Trigger, at the high heat trigger, evidence supports providing 15-minute rest breaks where employees are provided with shade, water, and a chance to shed PPE in order to reduce their body temperature every two hours.

c. Regulatory Option 3 – Upper bound heat index for sedentary work exemption.

When calculating the costs of requirements under the high heat trigger, this alternative leaves in-scope those employees who are considered sedentary but who work in non-climate-controlled indoor work conditions where temperatures are reasonably expected to meet or exceed the high heat trigger (i.e., a heat index of 90°F). This scope change results in more employees qualifying for high heat trigger rest breaks and requiring more observation time from designated persons. This option is estimated to increase the costs of the proposed standard by about $1.27 million.

d. Regulatory Option 4 – Medical surveillance.

Under the medical surveillance alternative, OSHA adds a requirement that all at-risk employees receive and complete a medical screening questionnaire to determine whether an employee may be predisposed to heat-related health risks. This questionnaire is assumed to take 15 minutes. All at-risk employees are assumed to take this questionnaire in the first year. Only new employees (as determined by using the annual hire rates for each sector) are modeled to take this questionnaire in subsequent years.

OSHA also assumes that employees screened as having a predisposition to heat-related health risks (assumed to be 23 percent of all at-risk employees) undergo a medical examination. This medical examination would take one hour of an at-risk worker's labor time. The cost of the medical examination itself, which the employer would need to cover at no cost to the employee, is estimated to cost $501.28.

Based on these assumptions, this option would increase the costs of the proposed standard by about $2.5 billion. The proposed standard currently includes a suite of controls that OSHA has preliminarily determined would confer a high level of protection to all workers, irrespective of individual risk factors.

II. Alternatives.

a. Alternative 1 – Review HIIPP at least every other year.

Under this regulatory alternative, establishments would need to review their HIIPP at least every other year instead of at least annually. Therefore, OSHA assumes that costs would be incurred every other year including both a designated person's time and the time of employees involved in the plan review and update as estimated in Section VIII.C., Costs of Compliance.

As shown in Table VIII.F.6., this alternative would reduce the cost of the proposed standard by about $86 million. OSHA believes it is important that the written program be reviewed and updated annually to ensure that any deficiencies are identified and remedied promptly. This also maintains consistency with other OSHA standards that require annual program review and update.

b. Alternative 2 – No written HIIPP required for establishments with < 20 employees.

This alternative adjusts the number of establishments that do not need to have their HIIPP in writing from establishments with ten or fewer employees to those with 20 or fewer employees and would reduce the cost of the proposed standard by about $2.1 million.

As discussed above, OSHA believes that the smallest employers can effectively administer a program that is not written. However, the agency believes that this is less effective for a slightly larger employer and, given the fact that employers with between 10 and 20 employees represents a proportionately large group of covered employers, OSHA believes there are benefits to requiring a written program for this group of employers.

c. Alternative 3 – 10-minute rest breaks at the high heat trigger.

This alternative revises the rest break requirements at the high heat trigger to require 10-minute rest breaks every two hours rather than 15-minute rest breaks. The time to walk to and from rest areas are maintained at two minutes for indoor employees and four minutes for outdoor employees.

This alternative reduces the cost of the proposed standard by about $3.2 billion. OSHA has proposed 15-minute rest breaks based on the available literature on rest break efficacy (see Section VII.F., Paragraph (f) Requirements at or above the High Heat Trigger).

d. Alternative 4 – Refresher trainings at least every other year.

Instead of annual refresher trainings, this alternative assumes refresher trainings take place every other year for both at-risk employees and designated persons. This alternative would reduce the cost of the proposed standard by about $238.5 million. Training is a highly effective method to protect workers from workplace hazards and regular refresher training is necessary to reinforce the topics of the training. Training must be frequent enough that employees maintain the knowledge necessary to recognize heat-related hazards and to understand and comply with the employer's HIIPP. OSHA has preliminarily determined that annual training is necessary for employees to maintain the requisite knowledge and that it is particularly important for outdoor workers to receive this training before the start of each heat season.

e. Alternative 5 – 95-degree high heat trigger.

The high heat trigger is increased from 90 degrees to 95 degrees under this alternative. Revising the high heat trigger upward results in fewer hours for which establishments need to implement required procedures under these high heat conditions and, thus, results in lower costs.

As shown in Table VIII.F.6., this alternative would reduce costs by about $1.9 billion (although this is a highly uncertain estimate). However, OSHA has preliminarily determined that a high heat trigger of a heat index of 90 °F would be highly protective and higher triggers may not be adequate for preventing HRIs (see Section V.B., Basis for Initial and High Heat Triggers).

f. Alternative 6 – Acclimatization for employees returning after 30 days away.

The amount of time away from work that qualifies an employee as a returning employee is adjusted from 14 days to 30 days under this alternative. While OSHA assumes that two percent of all employees would qualify as returning employees given the 14-day qualifying period, the agency assumes half a percent of employees would qualify with a 30-day period.

OSHA estimates that this alternative would reduce the cost of the proposed standard by about $850,000. Again, this is a highly uncertain estimate given the lack of data on the number of workers who are away from work for two weeks and those away for 30 days during heat season. This affects a small population, and OSHA has proposed the more protective approach of requiring acclimatization for workers who have been away for 14 consecutive days.

Are there additional burden reducing alternatives that the agency should include that would impact costs to entities? If so, what burden reducing alternatives would be most useful to assess these impacts on entities? The agency would welcome any suggestions in this area.

H. SBAR Panel Recommendations.

Table VIII.F.7. lists the SBAR Panel recommendations and OSHA's responses to these recommendations.

Table VIII.F.7. OSHA's Responses to the SBAR Panel Recommendations

Number	Finding	Recommendation	OSHA's Response
1	SERs expressed concern that the potential standard should not be a "one size fits all" approach and that it would be difficult for a standard to reasonably and effectively cover heat hazards in all settings and all regions of the U.S. SERs agreed that an OSHA standard should be flexible with a programmatic approach that allows employers to tailor their program to their particular workplace. SERs thought this flexibility was necessary for employers to prevent heat-related injuries and illnesses in their workplace most effectively. Some SERs thought the employer should determine what approaches should be implemented to address heat based on the conditions in their work settings as long as those approaches adhere to the regulatory framework. One SER asked whether the regulatory text, like the regulatory framework provided to SERs, could list multiple options employers can choose from.	The Panel recommends that OSHA's standard include performance-based provisions where practical to allow employers to tailor their heat injury and illness prevention program to their setting and situations, including the local climate and the type of work being performed, and also taking into consideration the size and complexity of the employer's operations. To the extent practicable, the Panel recommends that OSHA offer multiple methods of compliance with provisions of a heat standard.	The agency has drafted a proposed standard that ensures flexibility for workplaces. By incorporating elements that can be tailored to the workplace, OSHA is effectively addressing concerns of applicability to various workplace settings while establishing minimum requirements that are intended to ensure the heat injury and illness prevention program remains effective and accessible to employees. For example, the proposed standard does not apply to indoor workplaces where air conditioning consistently keeps the ambient temperature below 80°F, the proposed standard only requires employers with 10 or more employees to have a written plan, allows employers to choose the heat metric that works best for their workplace, and make other determinations based on their employee operations. OSHA requests further comment on the flexibility of the provisions included in the proposed heat standard.

Table VIII.F.7. OSHA's Responses to the SBAR Panel Recommendations

Number	Finding	Recommendation	OSHA's Response
2	SERs felt that the heat triggers that OSHA had suggested in the regulatory framework were too low and questioned whether the heat triggers were appropriate across different regions of the U.S. Some SERs reported finding OSHA's table of heat triggers presented in the regulatory framework and the use of an initial and a high heat trigger to be confusing and stressed that OSHA should keep the requirements simple. SERs also asked how the heat triggers had been determined and whether they were scientifically based. However, other SERs supported having two trigger levels and some reported that they had already implemented policies based on multiple trigger points already. Some SERs suggested using the National Weather Service heat advisory as a single measure for a heat trigger tailored to local conditions.	In light of input received from SERs, the Panel recommends that OSHA consider whether the heat trigger levels presented in the regulatory framework—both the initial and high heat triggers—are too low, and also recommends that the agency present these heat triggers as simply as possible to avoid confusion. The Panel also recommends that OSHA provide the methodology used to select the heat triggers, including any scientific evidence or other supporting data, along with consideration of potential alternatives.	The agency has provided a discussion of the methodology for determining the initial and high heat triggers in Section V.B., Basis for Initial and High Heat Triggers, which cites both observational and experimental evidence. OSHA simplified the triggers that were initially presented in the regulatory framework; there are no longer ambient temperature triggers or separate, lower forecast triggers. OSHA has also provided evidence that higher triggers, including the NWS heat advisories, would not be protective enough.
2	A few SERs voiced strong concerns about the underlying data on heat related injuries and illnesses. SERs felt that the numbers of illnesses, injuries, and fatalities reported in the BLS data are low relative to the total number of employees nationally, suggesting that any action or change is unnecessary. One SER thought that the number of heat illnesses and injuries is statistically insignificant, given the millions of workers in the labor	The Panel recommends that OSHA clearly present the data being used to justify a potential standard. The Panel recommends that OSHA thoroughly explore whether and how the injury, illness, and fatality data support the	The agency has provided a discussion of the data on occupational heat-related injuries, illnesses, and fatalities in Section V.A., Risk Assessment, and Section VIII.E., Benefits, including the significant likelihood of underreporting of such data. The agency relied on publicly available data from BLS, state health departments, and the peer-reviewed literature.

Table VIII.F.7. OSHA's Responses to the SBAR Panel Recommendations

Number	Finding	Recommendation	OSHA's Response
	force. SERs requested clarification on these data including requests that the data on heat-related injury and illness be published in the record by detailed industry.	promulgation of a heat standard.	OSHA discusses the need for the standard in Section III.B., Need for Proposal, and whether the threshold for agency action is met in Section VI., Significance of Risk.
3	Many SERs questioned whether the recordkeeping requirements that OSHA had suggested were necessary. Some SERs thought they would have to hire additional staff or take time away from other safety initiatives to complete the paperwork outlined in the regulatory framework. SERs thought that documenting rest breaks would be infeasible, and that recordkeeping of daily temperature monitoring was unnecessary and would be burdensome to comply with.	The Panel recommends that OSHA reconsider or simplify recordkeeping of temperature monitoring and not require documentation of rest breaks unless the agency can show that such a requirement is necessary or appropriate to protect workers. The Panel also recommends that OSHA reconsider other potential recordkeeping to determine if those are necessary or appropriate and whether they positively impact worker safety and health.	OSHA is proposing requirements in this section, based in part on feedback, which will allow more flexibility for workplaces. Employers of only indoor workplaces will be required to create written or electronic records of on-site temperature measurements and retain these records for a minimum of six months. Employers have flexibility on how they can comply with the recordkeeping requirement by using monitoring devices with sufficient storage capability, or employers could comply by creating and maintaining written records based on monitoring devices that do not have digital recording capabilities. OSHA has determined that this provision would have a positive impact on worker safety and health by assisting OSHA in determining conditions at the worksite, and aiding employers to identify trends in indoor temperatures and their effect on employee health and safety. In part based on feedback, OSHA is not requiring documentation of rest breaks.

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Number	Finding	Recommendation	OSHA's Response
4	SERs raised concerns about recordkeeping of heat related injuries and illnesses requiring only first aid. Other SERs asked why OSHA is considering requiring records of first-aid-only injuries and illnesses that are heat-related while not requiring records of first-aid-only injuries and illnesses that are not heat-related. Some SERs stated it was unclear what first aid means regarding heat illness with one SER wondering whether asking workers to take a break and hydrate because they appear to be hot would need to be captured as a first-aid incident.	The Panel recommends that OSHA not include a requirement for recording first-aid-only heat-related illnesses or injuries unless the agency can demonstrate some particular circumstances where such a requirement is necessary or appropriate to protect workers when such records are not required under OSHA's general injury and illness recordkeeping regulation.	OSHA is not proposing to require additional injury and illness reporting beyond what is required by the existing Recordkeeping standard (29 CFR 1904.7). The only proposed recordkeeping requirement applies to monitoring data collected for indoor work areas.
5	Many SERs reported already monitoring the temperature at their facility or job sites. SERs relied on various heat assessment methods including the OSHA/NIOSH Heat Safety Tool App, local weather forecasts, the National Weather Service's online calculator or measuring temperature with standard thermometers, heat index monitors, or wet bulb globe thermometers. Some SERs thought terms like "wet/dry bulb temperature" and "heat index" would be confusing while other SERs thought that measurements with a WBGT was complicated and may be difficult for some employers to use. SERs told the Panel about some difficulties they have with measuring temperature at their locations. SERs with indoor	The Panel recommends that OSHA allow flexibility in monitoring methods and not mandate a single method that employers must use to measure heat in their workplace or on their worksite. The Panel also recommends that OSHA clarify how and when temperature monitoring must occur for all employers but especially for those with indoor settings	The agency has drafted a proposed standard that would provide flexibility to employers in both what heat metric they can use and how they are required to monitor the worksite (including allowing outdoor employers to use the forecast instead of on-site monitoring). OSHA provides guidance on how and when monitoring must occur.

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Number	Finding	Recommendation	OSHA's Response
	worksites said that the temperature can vary across different parts of their facility. SERs with workers who are mobile and work at many different locations or elevations throughout the day said that temperature monitoring was a challenge for them because of various complicating factors.	and those with mobile workforces.	
6	The majority of the SERs said that they allowed their employees to take rest breaks when they needed to, but many objected to OSHA including a specific frequency or duration of breaks in a rule. Some SERs said that shorter, more frequent breaks might be ideal sometimes, while others said that the intensity of the job or other personal, physiological characteristics may make more frequent breaks necessary. Some SERs thought that giving 15-minute breaks every two hours would be unworkable in their situation. SERs in construction and manufacturing reported that there were times that work could not simply stop while workers took breaks (e.g., while pouring concrete, during certain industrial processes). In these cases, SERs reported that they rotated workers between more and less strenuous tasks. SERs with workers who wear complex PPE (e.g., construction, tree care, electric power) reported that their employees sometimes prefer to finish their work rather than stop for	The Panel recommends that OSHA consider allowing employers some flexibility, to the extent feasible within the constraints of the OSH Act, in the frequency of any rest breaks required in a rule. The Panel also recommends that OSHA clarify where workers can take breaks and provide the maximum flexibility possible to employers to determine what works best for their employees and situation. The Panel further recommends that OSHA clarify what, if any, activities employees	The proposed standard only requires rest breaks at the initial heat trigger when they are needed to prevent overheating. Under the high heat trigger, a minimum of a 15-minute paid rest break would be required every two hours because of increased risk of HRI at and above the high heat trigger, but some flexibility is provided by allowing a meal break to count as a rest break. Proposed provisions under the initial heat trigger specify the requirements for indoor and outdoor break areas and provide flexibility by allowing employers to choose from different options of cooling methods in the break area (e.g., shade OR air conditioning for outdoor break areas; air conditioning OR increased air movement and, if appropriate, de-humidification for indoor break areas). The summary and explanation for rest

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Number	Finding	Recommendation	OSHA's Response
	a break which would require removing and redonning their PPE. SERs whose employees worked at heights (e.g., roofing, telecommunications towers) expressed concern that these employees could be put in more danger if they were required to climb down from their working position for a break and back up afterwards. These SERs wondered if breaks needed to occur in a certain location like a shaded area on the ground or in an air-conditioned vehicle. A number of other SERs similarly wondered whether they had to provide air-conditioned break areas and require their employees take rest breaks in those areas. Some SERs said that their workers preferred to take breaks in non-air-conditioned spaces like shaded outdoor areas. A few SERs wondered whether other activities including things like downtime while waiting for materials to be delivered, toolbox talks or job briefings, engaging in non-strenuous work tasks, or driving between jobs could be considered breaks.	can engage in during rest breaks.	breaks under the high heat triggers clarifies that no work activities would be allowed during rest breaks.
7	SERs universally reported supplying drinking water to their employees generally with reusable bottles and water coolers, single use water bottles, or plumbed fountains or faucets. While SERs acknowledged the necessity of supplying drinking water, some objected to some of the specified potential requirements in the regulatory framework. One SER felt that the amount of water specified as required was too much. Some SERs thought that the phrase	The Panel recommends that OSHA consider eliminating or better defining the term "suitably cool" to provide clarity and take employee needs and preferences into account. The Panel also recommends that OSHA provide clarity on methods	OSHA is including the term "suitably cool" in the proposed standard to provide flexibility to employers and maintain consistency with the field sanitation standard (29 CFR 1928.110), which has incorporated a "suitably cool" requirement since it was promulgated in 1987. The phrase is also used in California's heat standard for outdoor workplaces (Cal. Code Regs. tit. 8, § 3395). As

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Number	Finding	Recommendation	OSHA's Response
	"suitably cool" was vague and did not take into account employee preferences for their water temperature.	for complying with any potential requirements related to the provision of water and allow for flexibility, when appropriate, in the amount of water required to be provided.	discussed in Risk Reduction, Section V.C., the temperature of drinking water impacts hydration levels, as cool or cold water has been found to be more palatable than warm water, thus leading to higher consumption of cool water and decreased risk of dehydration. Additional evidence highlighted in Section V.C., Risk Reduction, shows that cool fluid ingestion has beneficial effects for reducing heat strain. OSHA provides additional guidance on what it considers "suitably cool" in the Explanation of Proposed Requirements section of the proposed provision. OSHA is specifying the amount of water that employers need to provide to employees, not an amount that employees need to drink. OSHA provides guidance for how employers can comply with the provision of 1 quart of cool water every hour.

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Number	Finding	Recommendation	OSHA's Response
8	Many SERs objected to OSHA's option in the regulatory framework for gradual acclimatization to heat, requiring employees to gradually ramp up their exposure to heat over the course of a few days. Several SERs said that if they force employees to work fewer hours due to acclimatization requirements, these workers might just quit and look elsewhere for work. Other SERs reported that they must pay their union laborers for a minimum of four hours regardless of whether they worked that full time meaning that the SERs would be paying for time not worked during the acclimatization period. Other SERs said it would not be possible to move workers to light duty jobs during the acclimatization period either because they did not have enough of that type of work or because light duty tasks were not available at their workplaces. Some SERs thought that strictly prescribed acclimatization requirements were unnecessary because new workers they hired were either from the area and used to the weather, were coming from jobs where they performed similar tasks in similar conditions, or only those who were fit and able to work in hot weather would "self-select" into the types of jobs they offered. Many SERs reported having some form of enhanced supervision or "buddy system" for workers who were acclimatizing to the hot working conditions. Some said that new workers worked alongside supervisors during their first weeks on the job which allowed for supervision of their heat tolerance. Others said that the training process	The Panel recommends that OSHA provide multiple options for acclimatization in the rule to allow employers flexibility in determining the best method for acclimatizing their workers.	OSHA preliminarily finds that acclimatization is an effective preventative measure for preventing HRI and fatalities in unacclimatized workers. The proposed standard provides options for how to protect unacclimatized workers. The proposed standard provides a gradual exposure option as well as an option for employers to implement the requirements at the high heat trigger during an employee's first week of work. OSHA requests further comment on the proposed acclimatization provision and on a number of topics relating to acclimatization, including acclimatization during heat waves, acclimatization following illness, requests for examples of existing acclimatization programs and the clarity of the explanation of "similar heat conditions."

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Number	Finding	Recommendation	OSHA's Response
	where new employees are learning and working up to doing the jobs fully and on their own serves as an acclimatization process.		
9	SERs raised a number of concerns about applying a heat standard to workers who work alone and workers who move between job locations throughout the day. SERs mentioned that they were not sure how they would have to monitor the temperature when workers were working at multiple locations since employees could cover a large range with varying climate conditions throughout their workday. One SER said it was not clear what areas need to be routinely monitored if the work site is not fixed while others were concerned that tracking the	The Panel recommends that OSHA address the unique situations of employers whose employees work alone and/or travel to many worksites each day and offer flexibility to these employers and clarify the employer's responsibilities for employees in these circumstances.	OSHA is proposing to establish heat triggers using a measurement of the Heat Index which is more readily available through local forecast data or heat monitoring apps. As discussed in this preamble, employers do not need to monitor all work locations continuously and are only required to verify whether the temperature exceeds the triggers in order to implement the applicable protective measures. OSHA recognizes

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Number	Finding	Recommendation	OSHA's Response
	temperature forecasts and relevant heat triggers for the worksite that each worker or crew is visiting that day would be difficult. SERs said that such tracking becomes a greater challenge if each worker or crew visits multiple worksites within a day. SERs were also concerned that it would be difficult to monitor workers who work alone. SERs mentioned that it would be difficult to ensure that employees are taking required breaks with one SER saying that they believed this would become more difficult if mandated rest break durations depend on whether the temperatures were at or above the initial heat trigger or high heat trigger. Other SERs mentioned the difficulty of monitoring employees for signs and symptoms of heat injury and illness when employees are working alone. While some had equipment that monitored an employee's movement and reported to the employer if that movement stopped or procedures for regular check-ins via phone or tablet applications, other SERs said that they would not be able to implement a buddy system or close supervision of employees given the work arrangements.		that employees working alone can be at a greater risk for HRI due to the lack of immediate assistance or interventions. Therefore, OSHA has proposed that the employer maintain a form of two-way communication and regularly communicate with employees. When the high heat trigger is met or exceeded, the proposed standard would further require employers to stay in contact at least every two hours with employees working alone. Requirements for safety and health procedures when employees are working alone are not unique to this rule. OSHA believes that the employer responsibilities outlined under the proposal are necessary to ensure the safety of workers.

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Number	Finding	Recommendation	OSHA's Response
10	Almost all SERs agreed that training is one of the most important steps an employer can take to prevent heat injury and illness in their workers. SERs mentioned that they already provide some form of training on heat injury and illness prevention including recognition of signs and symptoms and how to respond and other topics including the importance of staying hydrated (electrolytes or water); working at a comfortable pace; contacting a supervisor to get an extra break or water; accessing and locations of cool down areas; sleeping well and being well rested; acclimatizing; and medical treatment of heat-related illnesses and injury. Training was reported to be provided in both formal and informal settings including regular training classes and tailgate or toolbox talks. Several SERs felt that a heat standard be centered around training; one SER thought that a heat standard should mandate training while questioning the necessity and usefulness of other potential requirements.	The Panel recommends that OSHA include a robust training provision in a heat standard. The Panel also recommends that OSHA continue to provide support for employer training efforts by providing training materials, sample curriculum, videos, and/or other methods.	OSHA preliminarily finds that it is necessary to train employees so they can recognize heat-related hazards and understand the appropriate steps they can take to minimize potential health effects in themselves and coworkers. Training on the employer's policies and procedures to address heat hazards would be an essential part of this proposed standard because it would help to ensure that employees understand heat hazards, the workplace-specific control measures that would be implemented to address the hazard, and the requirements of the proposed standard. OSHA has provided guidance on how employers can comply with the training provision and expects to provide sample training materials and other compliance assistance products to assist employers in implementing the requirements of the proposed standard if promulgated.

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Number	Finding	Recommendation	OSHA's Response
11	SERs reported a mix of informal and formal heat injury and illness prevention programs. Some said that they do not have a program that is in written form; while others said they have a written program that is relatively short in length (i.e., in bullet points). SERs were largely supportive of the idea of a written program or plan. SERs said that they believe a written plan could be beneficial and one SER said that their heat plan reduced the number of first-aid and more serious safety incidents, reduced workers' compensation costs, and maybe improved absenteeism. SERs said that employers should have flexibility to develop and implement such plans. Some SERs supported the potential exemption in the regulatory framework for very small employers (e.g., those with 10 or fewer employees) from the requirement for the plan to be in writing; one SER stated that requiring a written plan would place significant burden on these employers. Most SERs agreed that, if the standard required updates of a written plan, that requirement should be for annual reviews and updates. One SER commented that they believed option to review and update "whenever necessary to ensure ongoing effectiveness" or "whenever a heat-related illness or injury occurs" were vague and/or unclear.	The Panel recommends that OSHA include a requirement for a written heat injury and illness prevention program that allows employers the flexibility to tailor their plans to their specific industry, location, and activities. The Panel also recommends that OSHA consider an exemption for very small employers from the requirement for the plan to be in writing. The Panel further recommends that, unless the agency determines that it is appropriate to do otherwise, review and update of the plan be required annually and if updates are required in additional situations that those situations be clearly delineated to reduce confusion and ambiguity.	OSHA is proposing a requirement for a heat injury and illness prevention plan (HIIPP) as a provision of the standard. The proposed HIIPP requirement allows employers the flexibility to tailor their plans to their specific industry location and work activities. OSHA understands that a HIIPP must be adaptable to the physical characteristics of the work site and the job tasks performed by employees, as well as the hazards identified by the employer when designing their HIIPP. To increase flexibility, in cases where employers have multiple work sites that are substantially similar, the HIIPP may be developed by work site type rather than by individual work sites so long as any site-specific information is included in the plan (e.g., phone numbers and addresses). The proposed HIIPP requirement is consistent with the SBAR Panel's recommendation and requires that only employers with more than 10 employees need to have a written plan. For employers with 10 or fewer employees, the agency does not believe that there is a high likelihood of misunderstanding when employers communicate their HIIPPs to employees verbally. Employers with existing plans would be required to modify and/or update their current HIIPP plans to incorporate any

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Number	Finding	Recommendation	OSHA's Response
			missing required elements and provide training on these new updates or modifications to all employees. Furthermore, to delineate requirements surrounding HIIPP reviews and updates more clearly, OSHA is proposing to require the employer to review and evaluate the effectiveness of the HIIPP whenever a heat-related injury or illness occurs that results in death, days away from work, medical treatment beyond first aid, or loss of consciousness, but at least annually. Following each review, the employer would be required to update the HIIPP as necessary. OSHA preliminarily finds that a heat-related injury that results in death, days away from work, medical treatment beyond first aid or loss of consciousness warrants an evaluation of the HIIPP because it could potentially indicate a deficiency of the HIIPP. OSHA provides more information in Section VII.C., Explanation of Proposed Requirements, of the HIIPP requirement.
12	SERs disagreed with some specific time and cost estimates that were provided in the SER background document. SERs thought that OSHA's estimates for the amount of time it would take to develop the written plan and to conduct the hazard analysis were both too low as were the estimates related to monitoring of employees,	The Panel recommends that OSHA review time and cost estimates in the economic analysis and revise where appropriate to take the experience and feedback of the SERs into account.	All time and cost estimates provided in the SER background document were reviewed and revised for the NPRM where appropriate with consideration for SERs feedback and experience. As a result, travel time (time spent going to and from the break area) is added to the

Table VIII.F.7. OSHA's Responses to the SBAR Panel Recommendations

Number	Finding	Recommendation	OSHA's Response
	measuring or calculating the heat index or temperature, and recording heat-related illnesses or injuries. One SER said that OSHA's estimate of breaks was too low because it only counted the break time but did not account for the time spent going to and from the break area.		rest break costs. OSHA is not proposing additional requirements for recordkeeping for heat-related illnesses or injuries in the proposed standard, so it no longer requires a cost estimate. For some estimates, OSHA's review determined that the estimates in the SER background document were appropriate (e.g., outdoor monitoring costs). In other cases, OSHA determined that the estimates in the SER background document overestimated costs or did not account for overlap between provisions and therefore reduces the estimates (e.g., indoor hazard assessment).
13	Most SERs with indoor settings reported using some form of ventilation and air movement to cool their facilities. However, many of these SERs said it would be infeasible to lower the temperature using air-conditioning because their buildings were too large to do this effectively. A few SERs said they are limited in where they can place fans due to work processes or risk of contamination of materials or the air. Some SERs also said that they could not use some of the engineering controls discussed in the background documents such as misting fans (which could introduce slipping hazards or damage materials) or portable shelters (which cannot be used on work surfaces such as roofs). Other SERs discussed the difficulties of implementing engineering controls in buildings they do not own or	The Panel recommends that OSHA offer as much flexibility as possible to allow employers to implement engineering and administrative controls that are feasible and appropriate for their workplace and activities.	OSHA has drafted the rule to allow maximum flexibility in implementing engineering controls while still protecting workers. The agency has attempted to minimize feasibility issues by providing employers with multiple engineering control options for compliance, allowing them to select the controls that can be most effectively implemented. OSHA believes that the proposed control options are important and needed to adequately protect workers from HRIs as discussed in the *Explanation of Proposed Requirements*.

Table VIII.F.7. OSHA's Responses to the SBAR Panel Recommendations

Number	Finding	Recommendation	OSHA's Response
	when working on in-progress construction projects. SERs also questioned whether some administrative controls suggested in the background materials would work for their setting. While some SERs said they adjusted work start and stop times to avoid working during the hottest part of the day, some SERs said they were unable to do so, for example, because they could not work too early in residential areas or because employees preferred a later start time. Some SERs said they used text messages or other electronic communications to remind employees of or alert them to heat hazards. Some SERs whose employees spend a significant part of their day driving worried that sending their employees electronic notifications would distract them and put them at risk of motor vehicle accidents. Many SERs were, however, supportive of the idea of monitoring employees for signs and symptoms of heat illness and injury. Some SERs reported that they utilized a "buddy system" where employees monitored each other, or supervisors monitored employees, for signs and symptoms of heat illness or injury. Some SERs said they have found this practice very useful in reducing illnesses and injuries related to heat. Some SERs reported that they use technology like electronic monitors or check-ins via cell phone or tablet although SERs whose employees are mobile reported that that can be difficult if the employee is in a location with limited cell service. SERs suggested that biometric monitors or self-monitoring of urine color to		

Table VIII.F.7. OSHA's Responses to the SBAR Panel Recommendations

Number	Finding	Recommendation	OSHA's Response
	determine hydration levels could be useful as well.		

G. Distributional Analysis.

I. Impact of Heat on Underserved Populations.

Executive Order 13985, "Advancing Racial Equity and Support for Underserved Communities through the Federal Government," directs Federal agencies to conduct an equity assessment on a subset of the agencies' programs and policies. OSHA has chosen to include an equity assessment regarding the proposed standard for Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings and the potential impact on economically or historically underserved populations. The purpose of an equity assessment is to analyze the distribution of regulatory impacts across individuals, households, and businesses/industries, with particular attention to economically or historically underserved or vulnerable groups. This assessment, which is entirely separate from OSHA's legal findings and rationale supporting the proposed standard for Heat

Injury and Illness Prevention in Outdoor and Indoor Work Settings, concludes that the proposed standard would have a positive impact on underserved populations (e.g., low-income and Hispanic workers) by providing workplace protections from extreme temperatures that have a disproportionate impact on occupations held by individuals from underserved communities.

A. Heat Exposure of Workers by Socioeconomic Status.

Extreme temperatures affect the entire economy and pose a significant risk to individuals employed in workplaces (see Section II.B., Need for Proposal and Section II.C., Events Leading to the Proposal). This threat is unevenly distributed across demographic and socioeconomic groups, exacerbating inequalities. Individuals from underserved populations are more likely to work in occupations with heat-related risks (Ndugga et al., 2023). Evidence from the American Community Survey covering 2018 – 2022 (Ruggles et al., 2024) suggests that workers from historically underserved groups in core industries (see Section VIII.B.II.A., Potentially Affected Industries) have greater exposure to occupational heat-related hazards, with more severe outcomes that impact their ability to work. That includes, for example, exposure to high outdoor temperatures, radiant heat sources, or insufficient temperature control or ventilation in indoor work settings. The methodology to estimate exposure by demographic group is outlined in detail in Appendix C.

Figure VIII.G.1 shows that workers from low-income households are disproportionately exposed to heat-related hazards in (1) indoor work settings that emit heat during the production process, (2) indoor work settings that have inadequate climate control, or (3) outdoor work settings (see exposure definitions in Section VIII.B., Profile of Affected Industries). This is non-trivial as occupational injuries and illnesses cost the average worker $35,000 with wide-reaching health impacts including the threat of death (Leigh, 2011; Ndugga and Artiga, 2023; Park et al., 2021).[107] Thus, workers from low-income households who are often challenged with affording in-home air conditioning (Mann and Schuetz, 2022) face a concurrent burden: threat of costly workplace heat hazards.

Workers from low-income households are most vulnerable to occupational heat exposure across all phases of their careers. For example, workers aged 16 to 64 from households in the lowest income deciles face elevated indoor and outdoor exposure to heat-hazards (see Figure VIII.G.2.). The highest levels of exposure occur among workers aged 35 – 54 earning less than $60,000 (approximately 15 percent in indoor and outdoor workplaces). This high level of exposure occurs during these workers' peak earning years, posing a threat to not only health but also lifetime earnings which can facilitate socioeconomic mobility (see Figure VIII.G.2., Panels B and C).

Figures VIII.G.3. and VIII.G.4. show that there is variation in exposure among low-income workers by sex, ethnicity, and race. While low-income individuals from some underserved backgrounds have heat hazard exposure levels exceeding 10 percent of the worker population (e.g. workers identifying as female, Black, multi-racial), male and

[107] Note that this estimated cost to workers is different from the Value of a Statistical Injury (VSI) used to estimate benefits in Section VIII.E., Benefits. The VSI is an estimate of individuals' desire to avoid an illness or injury and calculates the willingness to pay to avoid said illness or injury. The $35,000 quoted reflects the average social cost of a workplace injury reported to workers compensation in 2021$.

Hispanic workers have the highest level of exposure to workplace heat hazards. Men earning less than $60,000 are nearly twice as likely to be exposed to workplace heat-related hazards than women, peaking at 17 percent for men working in non-climate controlled indoor settings and 19 percent for men working in outdoor settings.[108] Similarly, respective exposure to workplace heat hazards ranges from 16 percent to 19 percent in non-climate controlled indoor and outdoor settings among low-income Hispanic workers.

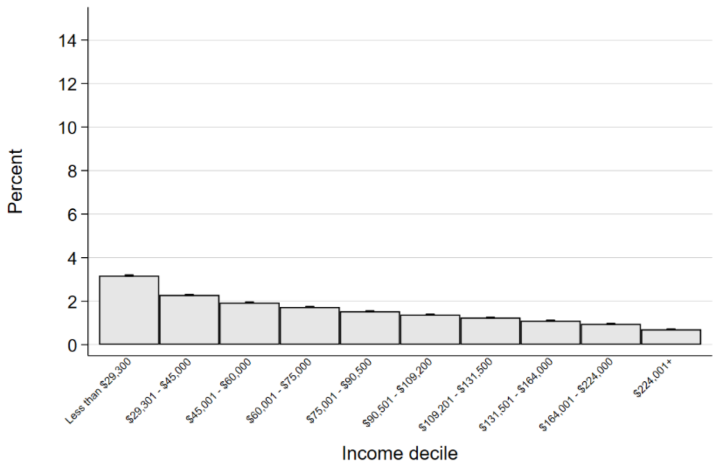
Despite evidence of elevated exposure along the socioeconomic gradient, research finds that many of the most vulnerable workers have minimal to no workplace protections to manage occupational heat stress (Morrissey-Basler et al., 2024; Luque et al., 2019; Flocks et al., 2013). Although workers are aware of the health consequences of exposure to occupational heat stress, they report a feeling of lack of control over the condition of their work setting (Flocks et al., 2013). In the absence of formal workplace protections, some vulnerable workers assume responsibility for and implement heat stress management practices to preserve their well-being rather than view the employer as the arbitrator for protection against occupational heat hazards (Luque et al., 2019). Some of these worker-initiated heat stress prevention strategies may not be grounded in evidence-based science. Lack of employer safeguards against elevated temperature can, in turn, reinforce disparities in occupational heat exposure that leave the most vulnerable workers overexposed to preventable heat-induced injuries, illnesses, and fatalities.

[108] For context, in 2022, the median annual earnings of men in the United States was $62,350 (Ruggles et al., 2024).

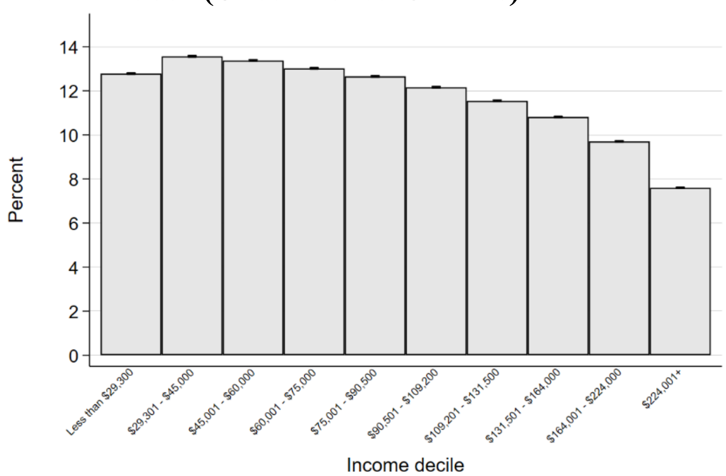
Disclaimer: This proposed rule has been submitted to the Office of the Federal Register (OFR) for publication, and is currently pending placement on public inspection at the OFR and publication in the Federal Register. This draft version of the proposed rule may vary slightly from the published document if minor technical or formatting changes are made during the OFR review process. Only the version published in the Federal Register is the official proposed rule.

Figure VIII.G.1. Workplace Heat Hazard Exposure by Income, 2018 - 2022

Panel A. Indoor (Production Process Heat)

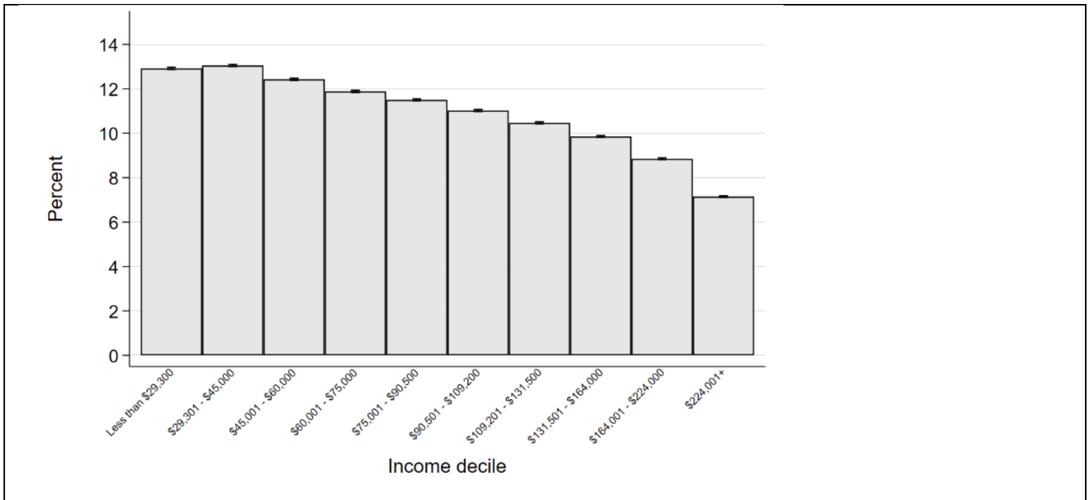


Panel B. Indoor (Uncontrolled Climate)



Panel C. Outdoor

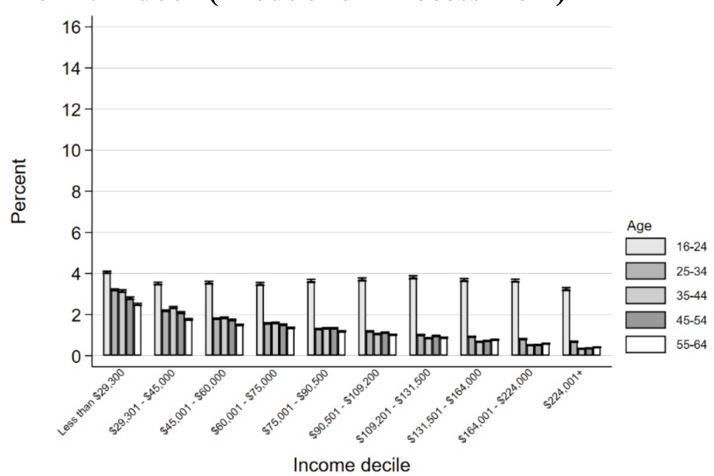
Disclaimer: This proposed rule has been submitted to the Office of the Federal Register (OFR) for publication, and is currently pending placement on public inspection at the OFR and publication in the Federal Register. This draft version of the proposed rule may vary slightly from the published document if minor technical or formatting changes are made during the OFR review process. Only the version published in the Federal Register is the official proposed rule.



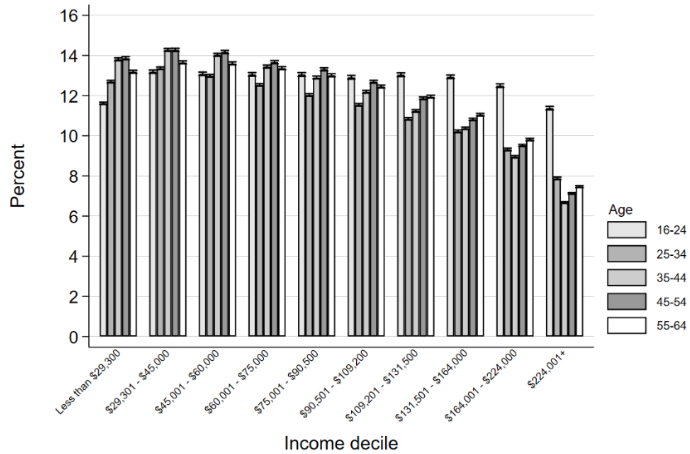
Source: OSHA calculations based on U.S. Census Bureau's American Community Survey (ACS) from 2018-2022 (Ruggles et al., 2024).

Figure VIII.G.2. Workplace Heat Hazard Exposure by Income and Age, 2018 – 2022

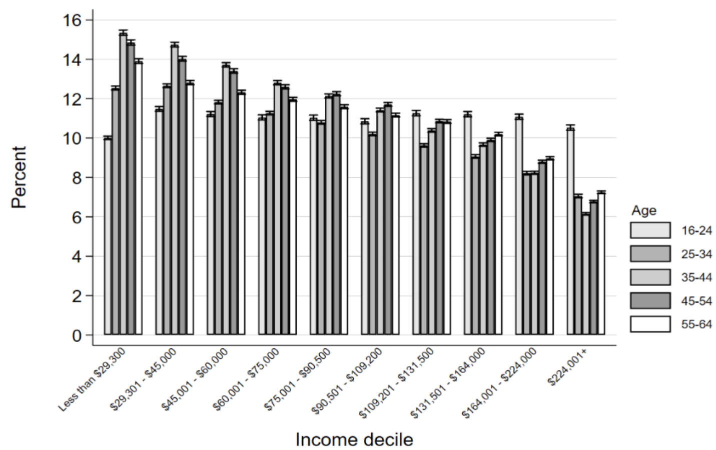
Panel A. Indoor (Production Process Heat)



Panel B. Indoor (Uncontrolled Climate)



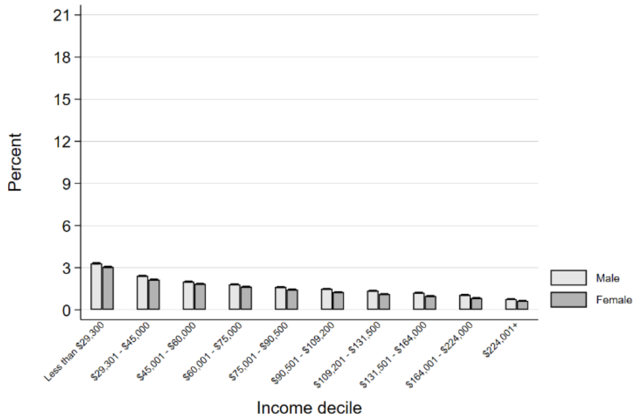
Panel C. Outdoor



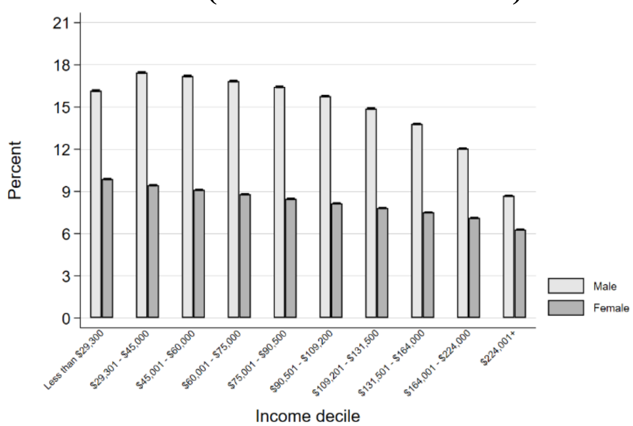
Source: OSHA calculations based on U.S. Census Bureau's American Community Survey (ACS) from 2018-2022 (Ruggles et al., 2024).

Figure VIII.G.3. Workplace Heat-Related Hazard Exposure by Income and Sex, 2018 – 2022

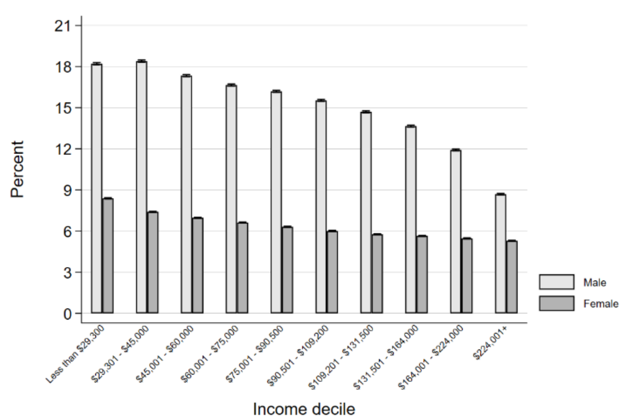
Panel A. Indoor (Production Process Heat)



Panel B. Indoor (Uncontrolled Climate)



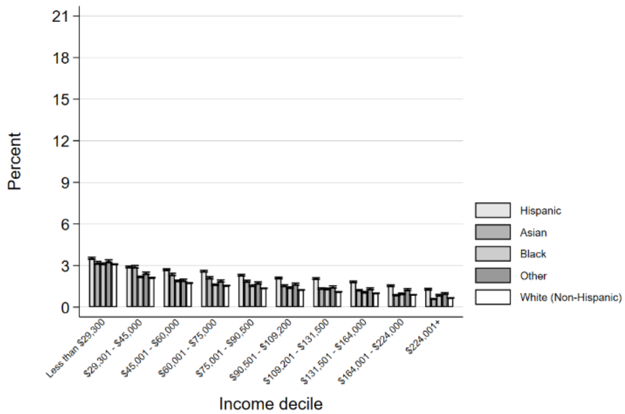
Panel C. Outdoor



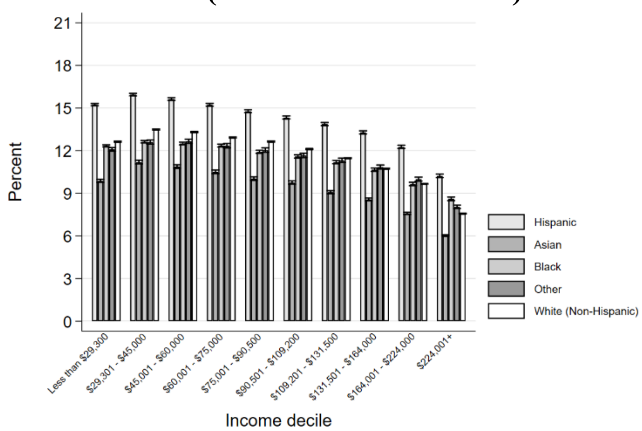
Source: OSHA calculations based on U.S. Census Bureau's American Community Survey (ACS) from 2018-2022 (Ruggles et al., 2024).

Figure VIII.G.4. Workplace Heat Hazard Exposure by Income, Ethnicity, and Race [a] (2018 – 2022)

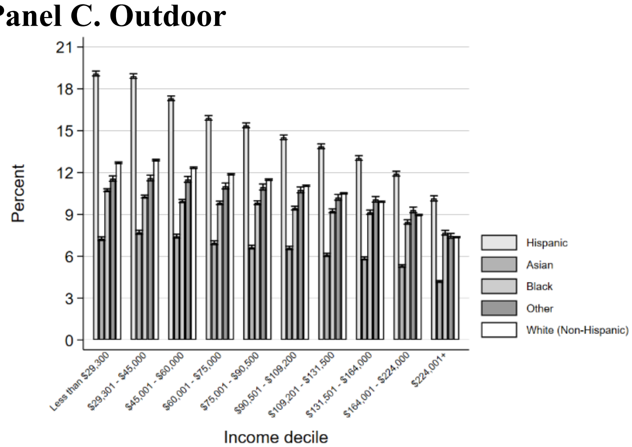
Panel A. Indoor (Production Process Heat)



Panel B. Indoor (Uncontrolled Climate)



Panel C. Outdoor



Source: OSHA calculations based on U.S. Census Bureau's American Community Survey (ACS) from 2018-2022 (Ruggles et al., 2024).

[a] Other group is composed of individuals with multi-race ancestry or those reporting a race other than Hispanic, Black, Asian, or White (non-Hispanic).

B. Productivity and Health Effects.

The figures above show the fraction of workers who are exposed to workplace heat-related hazards and therefore likely to be covered by the proposed standard. Under an assumption that benefits of the standard correspond 1-for-1 to coverage, this fraction can be translated into the fraction of workers benefiting from the standard. In other words, translating the results from the figures into benefits from the standard in terms of increased productivity, improved health, or other outcomes makes the assumption that all work-related exposure to heat is explained by industry and occupation. This assumption could over- or under-state the exposure to heat on the job that workers face. As a recent study of heat and occupational injuries discusses (Park et al., 2021), if there are compensating differentials for the risk associated with heat exposure, then workers exposed to the risk would be paid higher wages. This could be the case even within industry and occupation categories. Alternatively, if workers and employers negotiate over total compensation from income and amenities, then a worker could receive both lower wages and higher heat exposure (a workplace disamenity) due to imperfectly competitive labor markets.[109] (Burdett and Mortensen, 1998; Sorkin, 2018).

Existing studies on workplace-related heat exposure do not currently say which of these two possibilities holds within industry and occupation groups. A recent review summarizes research on the effect of temperature on labor productivity (Lai et al., 2023). The focus of the literature has been on educational outcomes, cross-country comparisons,

[109] The existence of jobs with different working conditions, in conjunction with variation in worker preferences, could in effect be the source of firms' power in the labor market that allows them to lower wages in the first place (Card et al., 2018).

or cross-industry effects. Recent work on intensive-margin labor supply (i.e., hours worked) and heat exposure in the U.S. shows that whether or not the industry of workers is controlled for in the statistical model does not largely change the estimated effect of heat exposure on time spent working (Neidell et al., 2021). This result indicates that industry-level differences in exposure to heat do not fully capture the effect of heat on labor supply. The study does not control for occupation group, so exposure within versus across occupations cannot be parsed.

An analysis of workplace injuries and heat exposure in California examines the distribution of heat-related occupational injuries (Park et. al., 2021). The analysis is done using California Department of Workers' Compensation data, and the injuries are geocoded at the zip code of the worksite. In an analysis that controls for zip code-by-month and county-by-month-by-year fixed effects (as well as precipitation), the authors find that for the average worker, injuries go up on days with temperature above 90°F. The increase in injuries is 36 percent larger for workers in the lowest income quintile compared to workers in the highest income quintile.[110] The analysis also examines effects by worker age and sex. It finds that workers younger than 30 years of age are 3 times more likely to experience a workplace injury on a day about 90°F compared to a worker older than 60.[111] Male workers are 2.3 times more likely to experience injury compared to female workers.[112]

[110] The point estimate for workers in the lowest quintile indicates a 0.0735 increase in injuries per day above 90°F for the lowest quintile and a 0.0541 increase for workers in the highest quintile.
[111] A point estimate of 0.0773 versus 0.0257.
[112] A point estimate of 0.0837 versus 0.0359.

If the controls in the statistical model substantially account for differences in heat exposure due to industry and occupation (for instance, because industries and occupations are segmented across zip codes), then the effect would suggest that the distribution of exposure percentages could be a lower bound on the distribution of realized benefits from the proposed standard stemming from reduced workplace injuries. Further analysis that explicitly accounts for industry and occupation-based exposure to heat would be useful to determining the extent to which workers within industry and occupation groups are differentially affected by heat-related occupational injuries.

II. Averted Injuries, Illnesses, and Fatalities by Socioeconomic Status.

Table VIII.G.1. shows the estimated number of workplace heat-related injuries and illnesses (HRIs) as well as heat-related fatalities averted by the proposed standard for Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings.[113] Table VIII.G.1., columns 1 and 3, present the pre-standard estimate of HRIs and heat-related fatalities. HRIs and heat-related fatalities are concentrated among workers who are low-income, in peak earning years (aged 35 – 54), male, or Hispanic. These vulnerable populations averaged 1,066 HRIs and 7 heat-related fatalities each year.

The Agency provides an example of the downstream impact of these consequential health events on firm costs in Table VIII.G.2. The estimated cost to the employer of an HRI, such as heat prostration (or exhaustion), is $79,081 assuming a 3

[113] The methodology to derive exposure is detailed in Appendix C.

percent profit margin.[114, 115] Thus populations with more HRIs elevate firm cost (see Table VIII.G.2., column 2). The extent to which the employer bears the full costs depends on the nature of their workers' compensation insurance policy. Nonetheless, the demographically disaggregated cost of projected HRIs suggests that concentrated efforts to reduce events among the most vulnerable populations can serve as a meaningful mechanism to reduce firm cost.

The Agency estimates that the proposed standard will reduce HRIs and heat-related fatalities among exposed workers by 65 and 95 percent, respectively (for more discussion, see Section VIII.E., Benefits). Table VIII.G.1., columns 2 and 4, present the projected average number of HRIs and heat-related fatalities averted by demographic group. The largest benefits are accrued to populations with heightened exposure: low-income, in peak earning years (aged 35 – 54), male, and Hispanic workers. This, in the case of heat prostration (or exhaustion), translates into an approximate 34 percent reduction in total firm costs among the respective demographic groups with heightened exposure (see Table VIII.G.2., column 5).

Table VIII.G.1. Projected Annual Average Number of HRIs & Fatalities Averted by Demographic Group, 2011 - 2022

	(1)	(2)	(3)	(4)
	HRIs	*Averted HRIs*	*Fatalities*	*Averted Fatalities*

[114] Total costs include a direct cost of $37,658 and indirect costs of $41,423.
[115] The estimate is derived using OSHA's Safety Pays Program's "Estimated Costs of Occupational Injuries and Illnesses and Estimated Impact on Company's Profitability Worksheet" *https://www.osha.gov/safetypays/estimator*. The tool projects and estimate of how injuries and illnesses may impact company's profitability. The above example assumes a 3 percent profit margin for heat prostration (or exhaustion)that cost $79,081 (i.e., includes a direct cost of $37,658 and indirect costs of $41,423).

Income decile				
Less than $29,300	1002.73	651.78	28.66	27.23
$29,301 - $45,000	1061.66	690.08	31.63	30.05
$45,001 - $60,000	1036.34	673.62	30.60	29.07
$60,001 - $75,000	1012.83	658.34	29.56	28.08
$75,001 - $90,500	988.55	642.55	28.70	27.26
$90,501 - $109,200	959.71	623.81	27.66	26.27
$109,201 - $131,500	921.58	599.03	26.16	24.86
$131,501 - $164,000	884.51	574.93	24.82	23.58
$164,001 - $224,000	830.46	539.80	22.68	21.54
Age				
16-24	882.46	573.60	23.88	22.69
25-34	931.32	605.36	26.52	25.19
35-44	974.79	633.61	28.89	27.45
45-54	980.33	637.21	28.52	27.09
55-64	971.74	631.63	27.52	26.14
Sex				
Male	1191.81	774.68	38.77	36.83
Female	679.87	441.91	14.30	13.59
Ethnicity & Race				
Hispanic	1214.52	789.44	39.98	37.98
Asian/Native American	753.23	489.60	16.49	15.67
Black/African American	879.14	571.44	21.89	20.79
Other	907.34	589.77	25.26	23.99
White (Non-Hispanic)	931.37	605.39	26.76	25.42

Table VIII.G.2. Projected Costs Savings of Annual HRI Cases by Demographic Group, 2011 – 2022

	(1)	(2)	(3)	(4)	(5)

	Pre-Standard		*# Cases Post-Standard*		*Savings*
	HRIs	*Total Costs*	*HRIs*	*Total Costs*	
Income decile					
Less than $29,300	1002.73	79,296,891.13	350.95	27,753,476.95	51,543,414.18
$29,301 - $45,000	1061.66	83,957,134.46	371.58	29,384,917.98	54,572,216.48
$45,001 - $60,000	1036.34	81,954,803.54	362.72	28,684,260.32	53,270,543.22
$60,001 - $75,000	1012.83	80,095,609.23	354.49	28,033,423.69	52,062,185.54
$75,001 - $90,500	988.55	78,175,522.55	346	27,362,026.00	50,813,496.55
$90,501 - $109,200	959.71	75,894,826.51	335.9	26,563,307.90	49,331,518.61
$109,201 - $131,500	921.58	72,879,467.98	322.55	25,507,576.55	47,371,891.43
$131,501 - $164,000	884.51	69,947,935.31	309.58	24,481,895.98	45,466,039.33
$164,001 - $224,000	830.46	65,673,607.26	290.66	22,985,683.46	42,687,923.80
Age					
16-24	882.46	69,785,819.26	308.86	24,424,957.66	45,360,861.60
25-34	931.32	73,649,716.92	325.96	25,777,242.76	47,872,474.16
35-44	974.79	77,087,367.99	341.18	26,980,855.58	50,106,512.41
45-54	980.33	77,525,476.73	343.12	27,134,272.72	50,391,204.01
55-64	971.74	76,846,170.94	340.11	26,896,238.91	49,949,932.03
Sex					
Male	1191.81	94,249,526.61	417.13	32,987,057.53	61,262,469.08
Female	679.87	53,764,799.47	237.96	18,818,114.76	34,946,684.71
Ethnicity & Race					
Hispanic	1214.52	96,045,456.12	425.08	33,615,751.48	62,429,704.64
Asian/Native American	753.23	59,566,181.63	263.63	20,848,124.03	38,718,057.60
Black/African American	879.14	69,523,270.34	307.7	24,333,223.70	45,190,046.64
Other	907.34	71,753,354.54	317.57	25,113,753.17	46,639,601.37
White (Non-Hispanic)	931.37	73,653,670.97	325.98	25,778,824.38	47,874,846.59

Source: OSHA calculations using OSHA's Safety Pays Program's "Estimated Costs of Occupational Injuries and Illnesses and Estimated Impact on Company's Profitability Worksheet" *https://www.osha.gov/safetypays/estimator*.

Note: OSHA's Safety Pays tool projects how injuries and illnesses may impact company's profitability. The above example assumes a 3 percent profit margin for heat prostration (or exhaustion)that cost $79,081 (i.e., includes a direct cost of $37,658 and indirect costs of $41,423). The extent to which the employer pays the direct costs depends on the nature of the employer's workers' compensation insurance policy. The employer always pays the indirect costs.

III. Which Business Owners Are Impacted by the Proposed Standard?

Figure VIII.G.5 shows, for owner-operated firms in industries affected by the proposed standard, ownership by demographic group in 2022. The analysis focuses on owner-operated firms because they are recorded in ACS data along with owner characteristics. As such, analysis of owner-operated firms cannot be generalized to the entire set of affected industries, but sheds light on an important subset of these affected industries.

In general, the distribution of costs (see Section VIII.C., Costs of Compliance) are expected to have differential effects on firms in industries with different characteristics. In a highly competitive product market with many competitor suppliers of nearly identical goods or services, there will be limited pass-through of regulatory costs assessed on only a subset of firms to consumers in the form of higher prices, as individual firms lack the market power to shift prices. If firms raised prices, consumers would simply shift consumption to other firms not burdened by similar costs (e.g., because they operate in temperate climate) that do not raise prices. Were firms earning almost zero profits prior to the imposition of these regulatory costs, it would be possible that these firms would shut down (and other producers would likely expand operations, as demand shifted to them). However, evidence on firm revenues in these industries indicates that firms will largely be able to bear these costs without shutting down (see Section VIII.D., Economic Feasibility).

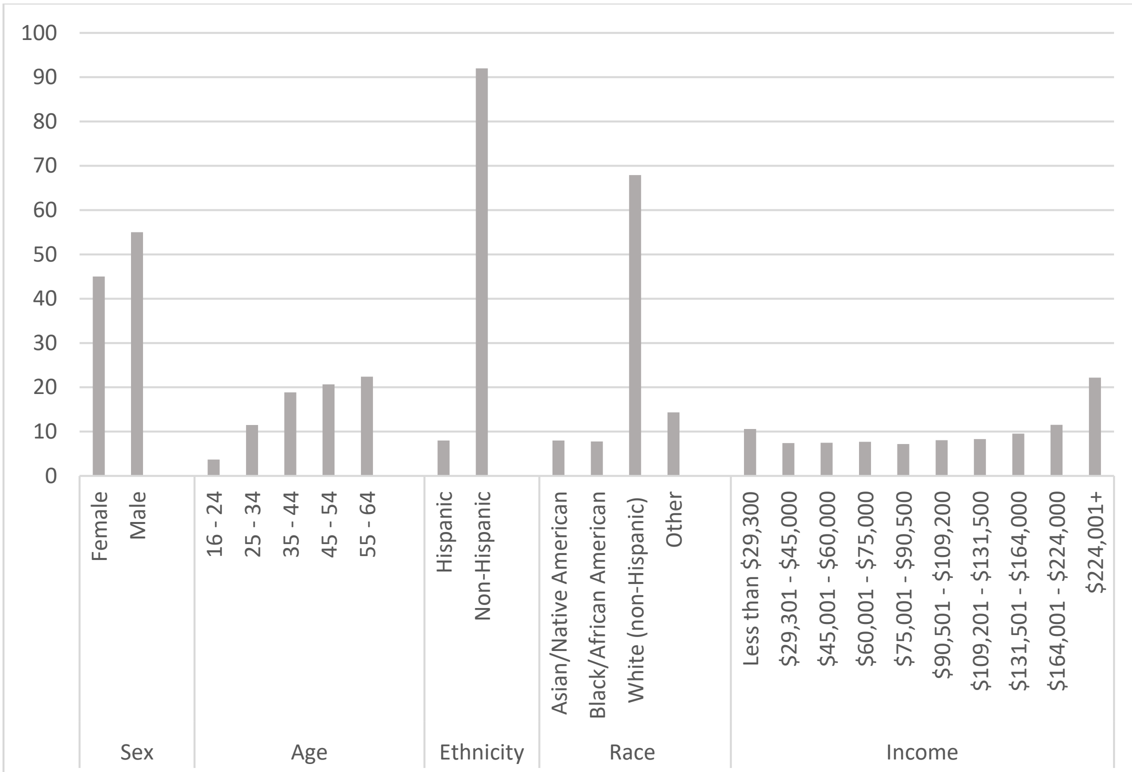
However, the assumption of perfectly competitive markets is not realized in the actual economy. To the extent that markets are less competitive, costs will be passed through in some combination to both consumers and firm owners, depending on the price elasticity of demand and the price elasticity of supply. In addition, frictions in the labor market will dictate how much of the costs are borne by workers, e.g., in the form of reduced pay or benefits. The difference in VSL for individuals who change and those that maintain the same job can inform estimates of the share of costs passed through to firm owners, workers, and consumers across industries in scope of this standard (see for example, Kniesner et al.'s 2012). Kniesner et al (2012) estimates a job switcher-derived VSL between $6.1 million and $10 million (in 2001 dollars) with a weighted average across job switchers and non-switchers is between $4.4 million and $5.5 million; the difference between these paired VSL estimates may approximate the average, over the first eight post-implementation years, of the portion of per-avoided-fatality benefits that accrues to workers without being offset by wage reductions. The benefits of the proposed standard could partially accrue in the form of increased productivity from workers less affected by heat. If firms are currently not offering the privately optimal level of workplace heat safety protection (e.g., due to principal-agent problems), these productivity gains could even theoretically exceed the increased costs borne by the firm. The magnitude of this effect determines whether firms are net better-off or worse-off, given both costs and increased productivity, as a result of the proposed standard (see Sections VIII.G.I., and VIII.G.II.).

The Census Bureau's 2022 American Business Survey (Census Bureau and National Center for Science and Engineering Statistics, 2023) covers economic and demographic characteristics for businesses and business owners by sex, ethnicity, race, and veteran status. Tables VIII.G.3. and VIII.G.4., derived from the survey, show that owners from historically underrepresented populations (e.g., women and racial minorities) tend to be less profitable and have heightened concerns about the financial viability of their business (see Tables VIII.G.3. and VIII.G.4.). These firms command 30 – 45 percent of the market.[116] Most owners were high-earning, non-Hispanic White males over the age of 34.

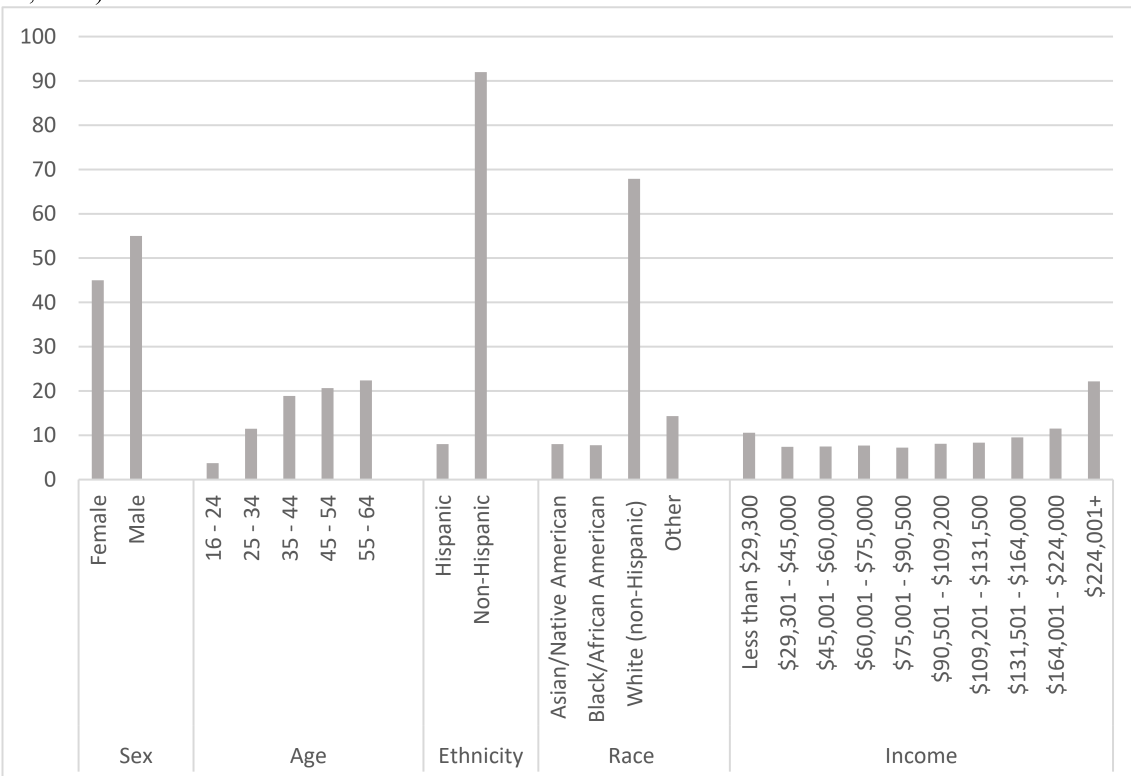
Taken together, this evidence suggests that the net benefits of the proposed standard for different groups (e.g., high-income and low-income populations) depend on how market competitiveness, elasticities of supply and demand, and the composition of groups affected by the standard's costs compare to the distribution of the standard's benefits for those groups (as discussed in Sections VIII.G.I. and VIII.G.II.).

Figure VIII.G.5. Market Share by Demographic Group, 2022

[116] Tables VIII.G.3. and VIII.G.4. reflect a representative sample of all U.S. industries.


100
90
80
70
60
50
40
30
20
10
0
Female
Male
16 - 24
25 - 34
35 - 44
45 - 54
55 - 64
Hispanic
Non-Hispanic
Asian/Native American
Black/African American
White (non-Hispanic)
Other
Less than $29,300
$29,301 - $45,000
$45,001 - $60,000
$60,001 - $75,000
$75,001 - $90,500
$90,501 - $109,200
$109,201 - $131,500
$131,501 - $164,000
$164,001 - $224,000
$224,001+
Sex
Age
Ethnicity
Race
Income

Source: OSHA calculations based on U.S. Census Bureau's 2022 Community Survey (ACS) (Ruggles et al., 2024).



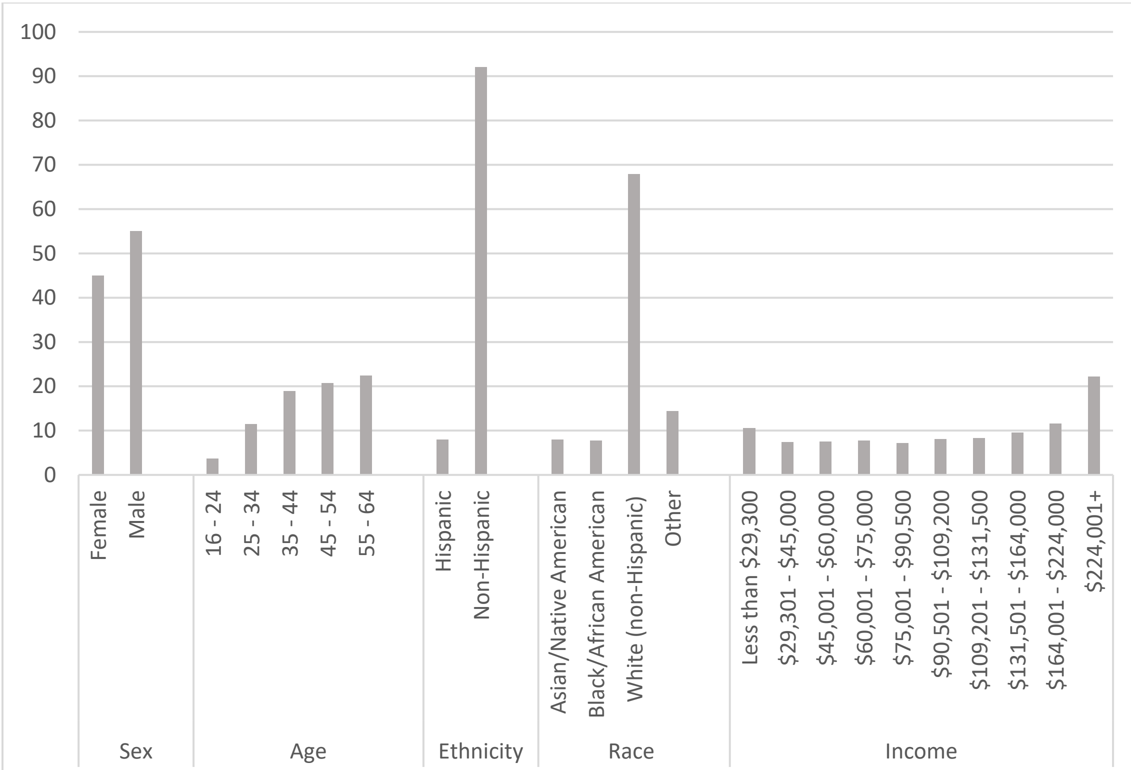


Table VIII.G.3. Financial Health of The Business In 2022 By Sex, Race, Ethnicity, Minority Status, and Veteran Status

	Level of concern about the financial health of the business in 2022			
	Percent of employer firms			
	Not that concerned	Somewhat concerned	Very concerned	Total
Total	41.9	39.4	18.7	100.0
Sex				
Female	38.7	39.9	21.4	100.0
Male	42.7	39.4	17.9	100.0
Equally male/female	41.7	39.6	18.7	100.0
Race				
White	44.0	38.5	17.4	100.0

Black or African American	26.9	41.5	31.6	100.0
American Indian and Alaska Native	30.1	42.1	27.8	100.0
Asian	27.0	47.2	25.8	100.0
Native Hawaiian and Other Pacific Islander	30.1	37.5	32.4	100.0
Ethnicity				
Hispanic	28.1	43.8	28.1	100.0
Equally Hispanic/non-Hispanic	34.1	40.5	25.5	100.0
Non-Hispanic	42.7	39.2	18.1	100.0
Minority Status				
Minority	27.6	45.2	27.2	100.0
Equally minority/nonminority	36.4	40.6	22.9	100.0
Nonminority	45.3	38.1	16.6	100.0
Veteran Status				
Veteran	44.5	37.1	18.4	100.0
Equally veteran/nonveteran	44.3	37.7	18.0	100.0
Nonveteran	41.4	39.7	18.8	100.0

Source: Census Bureau and National Center for Science and Engineering Statistics, 2023.
Note: Data are preliminary and will be revised when the final 2023 Annual Business Survey results are published. Firms were asked to report the percentage of ownership, sex, ethnicity, and race, for up to four persons owning the largest percentages in the business. A firm could be tabulated in more than one racial group for the following reasons: the sole owner was reported to be of more than one race; the majority owner was reported to be of more than one race; or a majority combination of owners was reported to be of more than one race. Firms classified as minority are those classified as any race and ethnicity combination other than non-Hispanic and White. For more information about the survey, visit *https://www.census.gov/programs-surveys/abs.html*. Unpublished estimates derived from this table by subtraction are subject to these same limitations and should not be attributed to the Census Bureau.

Table VIII.G.4. Business Profitability in 2022 By Sex, Race, Ethnicity, Minority Status and Veteran Status

	Business had profits, losses, or broke even
	Percent of employer firms

	Profits	Losses	Break even	Total
Total	65.6	19.6	14.8	100.0
Sex				
Female	63.2	21.3	15.5	100.0
Male	66.7	18.6	14.7	100.0
Equally male/female	65.1	20.1	14.8	100.0
Race				
White	66.9	18.9	14.2	100.0
Black or African American	49.5	30.2	20.3	100.0
American Indian and Alaska Native	59.1	22.1	18.9	100.0
Asian	60.7	21.3	18.0	100.0
Native Hawaiian and Other Pacific Islander	55.0	20.7	24.3	100.0
Ethnicity				
Hispanic	59.9	21.8	18.4	100.0
Equally Hispanic/non-Hispanic	60.9	23.5	15.6	100.0
Non-Hispanic	66.2	19.2	14.6	100.0
Minority Status				
Minority	59.1	22.6	18.3	100.0
Equally minority/nonminority	62.8	22.3	14.8	100.0
Nonminority	67.4	18.6	14.0	100.0
Veteran Status				
Veteran	62.3	21.9	15.9	100.0
Equally veteran/nonveteran	63.5	21.3	15.2	100.0
Nonveteran	65.9	19.3	14.8	100.0

Source: Census Bureau and National Center for Science and Engineering Statistics, 2023.
Note: Data are preliminary and will be revised when the final 2023 Annual Business Survey results are published. Firms were asked to report the percentage of ownership, sex, ethnicity, and race, for up to four persons owning the largest percentages in the business. A firm could be tabulated in more than one racial group for the following reasons: the sole owner was reported to be of more than one race; the majority owner was reported to be of more than one race; or a majority combination of owners was reported to be of more than one race. Firms classified as minority are those classified as any race and ethnicity combination other than non-Hispanic and White. For

more information about the survey, visit *https://www.census.gov/programs-surveys/abs.html*. Unpublished estimates derived from this table by subtraction are subject to these same limitations and should not be attributed to the Census Bureau.

IV. Conclusion.

The proposed standard for Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings is well-positioned to protect the most at-risk workers, across the socioeconomic gradient. In response to the Advance Notice of Proposed Rulemaking (ANPRM) for Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings, members of Congress emphasized that "jobs at the highest risk of heat stress illness and death are disproportionately held by workers of color" and occupational risk from heat is the "greatest for low-income workers" (OSHA-2021-0009-0266; 0270), a concern that was echoed by other commenters, including legal experts (see, e.g., OSHA-2021-0009-0524), employee representatives (see, e.g., OSHA-2021-0009-0661), and advocacy groups (see, e.g., OSHA-2021-0009-0655; 0712). Commenters also called for a heat standard that minimizes risks of "…compounding language, social service access, and wealth-building barriers" (OSHA-2021-0009-0522). The proposed standard reinforces occupational heat hazard protections for all workers through the adoption of agile and culturally attunable provisions. For example, the provisions:

- Requiring training on occupational heat-related risks and protections covered by this standard (e.g., rest breaks, water) to employees upon hire and each year can enhance knowledge of heat safe work practices, reducing risk of HRIs among less experienced or vulnerable workers;

- Requiring the provision of training in a language and literacy level appropriate for staff along with the opportunities for questions and answers ensures heat protections (e.g., paid rest breaks, cool drinking water) are understood and accessible to all; and
- Requiring an acclimatization protocol along with paid rest breaks that include adequate drinking water, shade (or air conditioning), and medical attention (if necessary) at initial and high heat triggers foster non-exploitive treatment of non-salaried vulnerable workers (e.g., farmworkers).

The provisions have economic effects extending beyond the direct benefits to workers in affected industries. Heat is the leading cause of weather-related deaths, estimated to cost the U.S. $1 billion in excess health care costs each year with a projection to potentially reach $14.5 trillion in economic damages via factors impacting the economic production over the next fifty years (Woolf et al., 2023; Deloitte, 2022). The standard is projected to reduce occupational heat-induced deaths which can offset the estimated health costs due to weather. The proposed standard is primed for responsiveness to workers of all levels of social vulnerability while counteracting the broader economic costs of extreme temperatures.

H. Appendix A. Description of the Cost Savings Approach.

I. Introduction.

This appendix details the underlying calculations of the potential cost savings from the proposed standard as a result of requiring employers to provide employees if-needed or scheduled rest breaks. The best available evidence indicates that when employees are exposed to heat and are not allowed to take rest breaks or adjust their work hours, they must pace themselves (i.e., work more slowly) to counteract the effects of heat exposure. OSHA has preliminarily determined that when employees are offered rest breaks, cost savings will accrue to employers currently noncompliant with the rest break requirement because employees will work more efficiently during the work time not spent on rest breaks (i.e., pace less), effectively replacing pacing with if-needed or scheduled rest breaks. First, for the three groups defined below, OSHA estimated the percentage of productivity loss at the initial heat trigger using the Heat Index (HI) option (i.e., (HI) at or above 80°F) and above the high heat trigger (i.e., HI at or above 90°F). These estimates were then translated to equivalent lost minutes of work time in an 8-hour work shift.

When working in hot conditions, OSHA assumes that employees can take three different measures to avoid overheating:

1) Measure #1: Employees *pace* themselves; for example, an employee shovels gravel at a slower pace in hot conditions than they would in cooler conditions.
2) Measure #2: Employees take *rest breaks if needed*; for example, an employee leans on their shovel for a few minutes at a time whenever they feel overwhelmed by the heat, which they otherwise would not do in cooler conditions.
3) Measure #3: Employees take *scheduled rest breaks*; for example, twice a day, for 15 minutes at a time, an employee sits in a cool or shaded area to drink water and recover from the heat.

Depending on what is allowed by their employers, employees can take multiple measures to avoid overheating (i.e., they are not mutually exclusive). Three groups of employees were defined based on possible combinations of measures:

1) Group #1: Employees who only use *pacing* (Measure #1). These employees do not take any rest breaks, possibly because their employer does not allow them to take breaks.
2) Group #2: Employees who take *rest breaks if needed* (Measure #2) and use *pacing* (Measure #1). These employees are allowed to take brief, unscheduled breaks by their employer. However, these rest breaks may not be long or frequent enough to allow for a full recovery from the heat exposure (return to normal body temperature of 98.6°F (37°C)). Therefore, these employees still display residual pacing while they work.
3) Group #3: Employees who take *scheduled rest breaks* (Measure #3), may take *rest breaks if needed* (Measure #2), and use *pacing* (Measure #1). These employees are allowed to take scheduled rest breaks, which may allow them to rehydrate and rest in a cool or shaded area, as well as rest breaks if needed. However, these rest breaks do not entirely eliminate productivity loss, as these employees also display residual pacing, though it is expected to be to a lesser extent than employees in Group #2.

II. Primary Approach.

This section describes the method that OSHA used to estimate labor productivity losses that result from pacing due to heat exposure. First, the general approach is summarized, next the general assumptions of the analysis are outlined, and then the calculations are detailed for Groups 1, 2, and 3.

A. Summary of Approach.

For the primary approach, OSHA searched for studies that examined how working in hot vs. cool conditions affect employee productivity. Eastern Research Group (ERG) performed several literature searches (ERG, 2022a; ERG, 2022b; ERG, 2022c) and identified a total of 71 unique studies that could inform the relationship between heat and various outcomes (e.g., labor productivity, heat strain). OSHA also reviewed the reference lists of these studies and identified an additional 37 studies that were potentially relevant to this topic. This yielded a total of 108 studies considered for inclusion for the purposes of estimating the impact of rest breaks on labor productivity at the initial heat and high heat triggers. Generally, studies were excluded if they did not meet the inclusion criteria listed below (more detailed reasons for exclusion are listed in Table VIII.H.A.3.).

- Measured labor productivity over a range of temperatures, so that a comparison could be made between a cool (REF) condition below the initial heat trigger (i.e., HI at or above 80°F), and a HOT condition(s) above the high heat trigger (i.e., HI at or above 90°F).
- Provided enough information on weather conditions so that HI could be estimated, even if based on historical weather data.
- Collected labor productivity data.
- Reported labor productivity as output per worker, per hour, or per day.

- Provided information as to whether breaks were offered, and if so, how long and frequent the breaks were.

Once studies were identified for inclusion, each included study was evaluated for four key pieces of information:

1) Which measure(s) employees took to avoid overheating (Measures #1, #2, and/or #3), allowing the assignment of employees to Groups #1, #2, or #3.
2) Weather data that describe the cool condition, or the referent (REF) condition. This could be when the HI was lowest, or when output was highest (i.e., 100% productivity). The HI was calculated based on the ambient or dry bulb temperature (T_a or T_d, respectively) and the relative humidity (RH).
3) Weather data that describe the HOT condition(s). This could be when the HI was highest, or at which output was lowest (i.e., 50% lower output means 50% productivity). Again, HI was calculated to ensure that the HOT condition(s) exceeded both the initial and high heat triggers.
4) Labor productivity at both the REF and HOT conditions, so that the loss in labor productivity (%) could be divided by the difference in HI (°F) and expressed as a rate of lost labor productivity per 1°F HI.

After calculating the rate of labor productivity loss per 1°F HI, OSHA calculated the (cumulative) labor productivity loss as a percentage relative to the REF condition at the initial heat trigger (HI of 80°F) and high heat trigger (HI of 90°F). This labor productivity loss was then translated into equivalent minutes of lost work time by multiplying by an 8-hour work shift (480 minutes).

Table VIII.H.A.1. Summary Table

Group	Study	HI at REF	HI at HOT	Productivity Loss per 1°F HI above REF	Productivity Loss at Initial Heat Trigger	Productivity Loss at High Heat Trigger
1	LoPalo, 2023	66.1°F	105.2°F	0.35%	23.4 min (4.9%)	40.2 min (8.4%)
	Foster et al., 2021	76.8°F	161.4°F	0.73%	11.3 min (2.4%)	46.4 min (9.7%)
	Hanna, 2004	79.2°F	122.3°F	0.86%	3.3 min (0.7%)	44.5 min (9.3%)
	Somanathan et al., 2021	63.4 - 82°F	90 - 105.8°F	0.29%	18.0 min (3.8%)	31.3 min (6.5%)
	Group Mean:			**0.56%**	**14.0 min**	**40.6 min**
2	Ioannou et al., 2017	72.1 - 75.6°F	96.9 - 103.1°F	0.73%	22.3 min (4.6%)	57.4 min (12.0%)
	Sahu et al., 2013	85.5°F	116.6°F	1.00%	0 min (0%)	21.6 min (4.2%)
	Group Mean:			**0.865%**	**11.2 min**	**39.5 min**
3	Dally et al., 2018	88.3°F	102.6°F	1.03%	0 min (0%)	8.4 min (1.8%)
	Group Mean:			**1.03%**	**0 min**	**8.4 min**

B. General Assumptions.

When estimating labor productivity loss in each study, OSHA made the following assumptions:

a. Unless otherwise specified, productivity at or below the REF condition is 100%.

b. Above the REF condition, the relationship between HI and labor productivity loss is linear, i.e., the rate of loss (per 1°F HI) is a constant. Therefore, the productivity loss function for any firm can be fully characterized by two parameters: the REF condition and the rate of loss.

c. Employees in Group 2 are allowed to take up to 10 minutes of rest breaks if needed (with 2–4 minutes of travel time to/from break areas).

d. Employees in Group 3 are allowed to take 30 minutes of scheduled rest breaks, along with 5 minutes of rest breaks if needed (with 2–4 minutes of travel time to/from break areas for each break).

e. An employee's expected productivity loss from pacing, given a specific temperature and the employer's rest break policy, can be estimated by the average productivity loss measured in studies where that rest break policy is in effect. In other words, the set of studies with each group fully characterizes the productivity loss that would be experienced by employees at a firm that offered the associated rest break policy, regardless of what rest break policy it currently offers.

f. An employee's expected productivity gains from taking new or newly scheduled rest breaks (versus not taking breaks or taking only if-needed breaks) can be estimated by differences in productivity losses due to pacing, as measured at the initial temperature (i.e., trigger) at which the rest break policy goes into effect.[117].

C. Productivity Loss Estimates by Group.

I. Group 1 Studies.

LoPalo (2023) assessed the effects of temperature on the productivity of 9,000 Demographic and Health Surveys interviewers in 46 countries. Interviewers were paid an

[117] All else equal, using the initial temperature (i.e., trigger) rather than the temperature inputs used elsewhere in this PEA will yield underestimates of the effects reported in Table VIII.H.A.1. When subsequently performing subtraction (for expressing productivity differences across Groups), there is ambiguity about the direction of misestimation—because the difference between two underestimated amounts may be over- or underestimated.

hourly wage and were assumed to be acclimatized because they were "recruited within a region of a country as much as possible so that the interviewer [did] not seem foreign to the respondent" (p. 197). The author concluded that "high temperatures are detrimental to productivity, with interviewers experiencing a 13.6 percent loss in interviews per hour on days over 85°F wet bulb" (pp. 208-209).

The author clarifies, "more specifically, I estimate the effect of daily average wet bulb temperature falling into a certain bin on my outcome variable of interest, relative to an excluded bin of 50–60°F (50–60°F wet bulb corresponds with a median dry bulb temperature of 66°F in my sample)" (p. 205). Thus, a dry bulb temperature (T_d) of 66°F was selected for the calculation of the heat index (HI) for the REF condition. Per Figure 1 (p. 203), in this sample, a T_d of 66°F yields a wet bulb temperature of 55°F when RH is 80%. Therefore, OSHA used 80% RH for the calculation of HI. A T_d of 66°F and 80% RH yielded an HI of 66.1°F for the REF condition.

The author created bins of both T_d and wet bulb temperature; the highest bin for T_d was ">95°F". Therefore, a T_d of 95°F was used to calculate the HI for the HOT condition. The author states, "the highest daily average wet bulb temperature in my sample is 87.7°F, while the highest daily average dry bulb temperature is 102.6°F" (p. 206). Per Figure 1 (p. 203), in this sample, a T_d of 102.6°F yields a wet bulb temperature of 87.7°F when RH is 50%. Therefore, OSHA used 50% RH for the calculation of HI. A T_d of 95°F and 50% RH yielded an HI of 105.2°F for the HOT condition.

Finally, the productivity loss from the REF condition to the HOT condition was estimated. In Table 2. (p. 209), the author provides a regression estimate for each bin of dry bulb temperature to indicate its effect on the number of interviews completed per hour. The estimate in Column 2 (-0.135, or 13.5% loss) accounted for both T_d and high humidity and most closely matched the estimate in Column 4 for wet bulb temperature (-0.136, or 13.6% loss). Therefore, OSHA selected the estimate for T_d and high humidity, which yielded a rate of productivity loss of 0.35% per 1°F HI.

$$\frac{13.5\%}{|66.1 - 105.2|°\text{F}} = 0.35\% \text{ per } 1°\text{F HI}$$

Relative to the REF condition (66.1°F HI), the productivity loss at the initial heat trigger (80°F HI) is 4.87%. For an 8-hour work shift (480 minutes), this translates to a loss of 23.4 minutes.

$$\frac{0.35\%}{1°\text{F HI}} * (80 - 66.1)°\text{F HI} = 4.87\% \qquad 4.87\% * 480 \text{ minutes} = 23.4 \text{ minutes}$$

Relative to the REF condition (66.1°F HI), the productivity loss at the high heat trigger (90°F HI) is 8.37%. For an 8-hour work shift (480 minutes), this translates to a loss of 40.2 minutes.

$$\frac{0.35\%}{1°\text{F HI}} * (90 - 66.1)°\text{F HI} = 8.37\% \qquad 8.37\% * 480 \text{ minutes} = 40.2 \text{ minutes}$$

Foster et al. (2021) assessed the effects of temperature on physical work capacity (PWC) of 40 unacclimatized young adult males at 22 different combinations of air temperature (T_a) and relative humidity (RH). First, the authors measured maximal PWC (i.e., 100% productivity) at a T_a of 59°F and RH of 50%. Then, the authors assessed PWC under various conditions, with T_a ranging from 77°F to 122°F and RH ranging from 20% to 80%.

To determine an appropriate REF condition, OSHA plotted the low-clothing coverage estimates from Table 2. (p. 1222) and found a sigmoidal curve. That is, as T_a increased from 59°F to 77°F, the curve was nearly flat, indicating minimal productivity decline. Then, at a T_a of 77°F (and 50% RH), productivity began to decline in a nearly perfect linear fashion ($R^2 = 0.99$). Therefore, the REF condition was selected as a T_a of 77°F and RH of 50%. This combination yielded an HI of 76.8°F for the REF condition.

The combination of temperature and humidity that corresponded the greatest productivity loss (66%) along the linear portion of the curve was a T_a of 104°F and RH of 70%. This combination yielded an HI of 161.4°F for the HOT condition.

The productivity loss from the REF condition to the HOT condition was estimated. In Table 2. (p. 1222), the authors reported that at the REF condition (T_a 77°F, RH 50%), PWC was 96%, and at the HOT condition (T_a 104°F, RH 70%), PWC was 34%. This yielded a rate of productivity loss of 0.73% per 1°F HI.

$$\frac{(96 - 34)\%}{|76.8 - 161.4|°\text{F}} = 0.73\% \text{ per } 1°\text{F HI}$$

Relative to the REF condition (76.8°F HI), the productivity loss at the initial heat trigger (80°F HI) is 2.35%. For an 8-hour work shift (480 minutes), this translates to a loss of 11.3 minutes.

$$\frac{0.73\%}{1°\text{F HI}} * (80 - 76.8)°\text{F HI} = 2.35\% \quad 2.35\% * 480 \text{ minutes} = 11.3 \text{ minutes}$$

Relative to the REF condition (76.8°F HI), the productivity loss at the high heat trigger (90°F HI) is 9.67%. For an 8-hour work shift (480 minutes), this translates to a loss of 46.4 minutes.

$\frac{0.73\%}{1°\text{F HI}} * (90 - 76.8)°\text{F HI} = 9.67\%$ $\qquad$ $9.67\% * 480 \text{ minutes} = 46.4 \text{ minutes}$

Hanna (2004) assessed the effects of temperature on the productivity of two electrical journeymen in a climatic chamber at various combinations of T_a (ranging from -10°F to 110°F, in increments of 10°F) and RH (ranging from 40% to 80%, in increments of 10%). The journeymen were assessed for their performance of a routine work task (installing duplex receptacles) over a total of 6 days of testing. The author stated that "for the purpose of this study, the average number of receptacles installed in one hour during the first day of work measurement at 70°F and 60% RH is expressed as 100% productivity."

However, per Chart 2-1 (p. 15), productivity clearly only began to decline at a T_a of 80°F and RH of 30%. Therefore, the REF condition was selected as a T_a of 80°F and RH of 30%. This combination yielded an HI of 79.2°F for the REF condition.

According to Table 2.3. (p. 11), the combination of temperature and humidity that corresponded the greatest productivity loss (38%) was a T_a of 110°F and RH of 30%. This combination yielded an HI of 122.3°F for the HOT condition.

The productivity loss from the REF condition to the HOT condition was estimated. In Table 2.3. (p. 11), the authors reported that at the REF condition (T_a 80°F, RH 30%), productivity was 99%, and at the HOT condition (T_a 110°F, RH 30%), productivity was 62%. This yielded a rate of productivity loss of 0.86% per 1°F HI.

$$\frac{(99 - 62)\%}{|79.2 - 122.3|°\text{F}} = 0.86\% \text{ per } 1°\text{F HI}$$

Relative to the REF condition (79.2°F HI), the productivity loss at the initial heat trigger (80°F HI) is 0.69%. For an 8-hour work shift (480 minutes), this translates to a loss of 3.3 minutes.

$$\frac{0.86\%}{1°\text{F HI}} * (80 - 79.2)°\text{F HI} = 0.69\% \qquad 0.69\% * 480 \text{ minutes} = 3.3 \text{ minutes}$$

Relative to the REF condition (79.2°F HI), the productivity loss at the high heat trigger (90°F HI) is 9.27%. For an 8-hour work shift (480 minutes), this translates to a loss of 44.5 minutes.

$$\frac{0.86\%}{1°\text{F HI}} * (90 - 79.2)°\text{F HI} = 9.27\% \qquad 9.27\% * 480 \text{ minutes} = 44.5 \text{ minutes}$$

Somanathan et al. (2021) assessed the productivity of indoor workers in cloth-weaving, garment-sewing, and steel mill industries in India. OSHA only analyzed garment-sewing workers, who were “paid monthly wages” (p. 1803), and their productivity was assessed as “actual hourly output, when controlled for the target [output]” from “103 sewing lines over a period of 730 days during the calendar years of 2012 and 2013” (p. 1804). OSHA excluded workers from the cloth weaving industry because productivity was not reported for the full range of temperatures (Figure 1C, p. 1808). OSHA also excluded certain garment plants and the steel mill, as these facilities were climate-controlled (p. 1806), and workers experienced limited variations in temperature.

The authors reported productivity as a function of daily maximum temperature (T_a) in Figure 1 (p. 1808). Temperature data came from “recordings from public weather stations within the cities where… garment-sewing factories are located” (p. 1806), i.e., the National Capital Region (NCR), Hyderabad, and Chhindwara. The authors created temperature bins for each industry, as well as the equivalent bins based on wet-bulb temperature (WBT), which accounts for both T_a and RH (Appendix, p. 3).

	Garment-Sewing (inside NCR)		Garment-Sewing (outside NCR)	
	Temperature Bin	Equivalent WBT Bin	Temperature Bin	Equivalent WBT Bin
REF	< 19°C	< 15°C	< 27°C	< 23°C
HOT	> 33°C	> 25.5°C	> 33°C	> 29°C
Max	> 35°C	> 27°C	> 35°C	> 31°C

To calculate the HI for the REF condition in the garment-sewing industry, the T_a for the lowest bin was used and RH was calculated using the equation below (provided by the authors). Inside the NCR, the T_a was 66.2°F (19°C) and RH was calculated at 18%, yielding an HI of 63.4°F for the REF condition. Outside the NCR, the T_a was 80.6°F (27°C) and RH was calculated as 56%, yielding an HI of 82°F for the REF condition.

$$WBT = 0.567T_a + 0.216\left(\frac{RH}{100} * 6.105 * \exp\left(\frac{17.27T_a}{237.7 + T_a}\right)\right) + 3.38$$

To calculate the HI for the HOT condition in the garment-sewing industry, the T_a for the second highest bin was used because this is where productivity losses reached a maximum and plateaued (Figure 1A-B, p. 1808). RH was again calculated using the equation above. Inside the NCR, the T_a was 91.4°F (33°C) and RH was calculated at 31%, yielding an HI of 90°F for the HOT condition. Outside the NCR, the T_a was also 91.4°F (33°C) and RH was calculated as 64%, yielding an HI of 105.8°F for the HOT condition.

The productivity losses from the REF conditions to the HOT conditions were estimated using data from Figure A.3 (Appendix, p. 6). For garment workers inside the NCR, the authors reported that at the HOT condition, there was a 12% loss in productivity, which yields a rate of 0.45% per 1°F HI. Outside the NCR, the authors reported that at the HOT condition, there was a 3% loss in productivity, which yields a rate of 0.13% per 1°F HI.

Inside NCR: $\frac{(100-88)\%}{|63.4-90|°\text{F}} = 0.45\%\text{ per }1°\text{F HI}$ Outside NCR: $\frac{(100-97)\%}{|82-105.8|°\text{F}} = 0.13\%\text{ per }1°\text{F HI}$

Mean: $\frac{(0.45+0.13)\%\text{ per }1°\text{F HI}}{2} = 0.29\%\text{ per }1°\text{F HI}$

Relative to the REF condition, inside the NCR, productivity loss at the initial heat trigger (80°F HI) was 7.49%. For an 8-hour work shift (480 minutes), this translates to a loss of 35.9 minutes. Outside the NCR, productivity loss is assumed to be 0% because the REF (82°F HI) was above the initial heat trigger. The mean loss is 18.0 minutes.

Inside NCR: $\frac{0.45\%}{1°\text{F HI}} * (80 - 63.4)°\text{F HI} = 7.49\%$ $7.49\% * 480\text{ minutes} = 35.9\text{ minutes}$

Outside NCR: 0 minutes

Mean: $\frac{(35.9+0)\text{ minutes}}{2} = 18.0\text{ minutes}$

Relative to the REF condition, inside the NCR, productivity loss at the high heat trigger (90°F HI) was 12.0%. For an 8-hour work shift (480 minutes), this translates to a loss of 57.6 minutes. Outside the NCR, productivity loss at the high heat trigger was 1.0%, or a loss of 4.8 minutes. The mean loss is 31.3 minutes.

Inside NCR: $\frac{0.45\%}{1°\mathrm{F\ HI}} * (90 - 63.4)°\mathrm{F\ HI} = 12.0\% \quad 12.0\% * 480\ \mathrm{minutes} = 57.6\ \mathrm{minutes}$

Outside NCR: $\frac{0.13\%}{1°\mathrm{F\ HI}} * (90 - 82)°\mathrm{F\ HI} = 1.04\% \quad 1.04\% * 480\ \mathrm{minutes} = 5.0\ \mathrm{minutes}$

Mean: $\frac{(57.6+5.0)\ \mathrm{minutes}}{2} = 31.3\ \mathrm{minutes}$II. Group 2 Studies.

Ioannou et al. (2017) assessed the effects of temperature on the productivity of 7 grape-picking workers in Cyprus over 4 study days: two in the summer (August 17–18, 2016) and two in the autumn (October 11–12, 2016). The workers were “healthy and heat-acclimatized” (p. 332), and their pay system was not specified. They were “officially not provided with any breaks other than the lunch break” (p. 338) but did take “irregular work breaks... defined as any unprescribed work cessation determined by workers’ own judgment, and not based on specific time intervals or instructions” (p. 333). Productivity was assessed as “the number of boxes full of grapes picked by the entire group in each hour divided by the number of workers” (p. 333).

The authors reported hourly productivity as a function of wet bulb globe temperature (WBGT). The calculation of WBGT was based on weather data (including T_a and RH) from the Paphos International Airport in Cyprus. OSHA accessed the same historical weather data (wunderground.com) for the 4 study days and calculated the hourly HI (based on T_a and RH) for each study day. On October 11 and 12, the highest HI was still below the high heat trigger (83.8°F and 85.6°F, respectively) and would have required extrapolation to estimate the rate of productivity loss. Therefore, only weather and productivity data from August 17 and 18 was considered. The lowest HI for each day served as the REF condition for that day; the REF HI for August 17 was 75.6°F (based on a T_a of 75°F and 73% RH), and the REF HI for August 18 was 72.1°F (based on a T_a of 72°F and 69% RH).

The highest HI for each day served as the HOT condition. The HOT HI for August 17 was 96.9°F (based on a T_a of 86°F and 74% RH), and the HOT HI for August 18 was 103.1°F (based on a T_a of 88°F and 75% RH).

The productivity loss from the REF condition to the HOT condition for the 2 study days (August 17-18) was estimated by plotting the hourly HI against the productivity data (boxes per hour) in Figure 6 (p. 337). The rate of productivity loss was 0.65% per 1°F HI for August 17, and 0.81% per 1°F HI on August 18, which yielded a mean rate of 0.73% per 1°F HI.

August 17: $\frac{(100-86.1)\%}{|75.6-96.9|°\text{F}} = 0.65\% \text{ per } 1°\text{F HI}$ August 18: $\frac{(100-74.9)\%}{|72.1-103.1|°\text{F}} =$

$0.81\% \text{ per } 1°\text{F HI}$

$$\text{Mean: } \frac{(0.65+0.81)\% \text{ per } 1°\text{F HI}}{2} = 0.73\% \text{ per } 1°\text{F HI}$$

Relative to the REF conditions, the productivity loss at the initial heat trigger (80°F HI) was 2.87% for August 17 and 6.40% for August 18. For an 8-hour work shift (480 minutes), this translates to a loss of 13.8 and 30.7 minutes, respectively, and a mean loss of 22.3 minutes.

$$\text{August 17: } \frac{0.65\%}{1°\text{F HI}} * (80 - 75.6)°\text{F HI} = 2.87\% \quad 2.87\% * 480 \text{ minutes} = 13.8 \text{ minutes}$$

$$\text{August 18:} \quad \frac{0.81\%}{1°\text{F HI}} * (80 - 72.1)°\text{F HI} = 6.40\% \qquad 6.40\% * 480 \text{ minutes} = 30.7 \text{ minutes}$$

$$\text{Mean:} \quad \frac{(13.7+30.7) \text{ minutes}}{2} = 22.3 \text{ minutes}$$

Relative to the REF conditions, the productivity loss at the high heat trigger (90°F HI) was 9.40% for August 17 and 14.5% for August 18. For an 8-hour work shift (480 minutes), this translates to a loss of 45.1 and 69.6 minutes, respectively, and a mean loss of 57.4 minutes.

$$\text{August 17:} \quad \frac{0.65\%}{1°\text{F HI}} * (90 - 75.6)°\text{F HI} = 9.40\% \qquad 9.40\% * 480 \text{ minutes} = 45.1 \text{ minutes}$$

$$\text{August 18:} \quad \frac{0.81\%}{1°\text{F HI}} * (90 - 72.1)°\text{F HI} = 14.5\% \qquad 14.5\% * 480 \text{ minutes} = 69.6 \text{ minutes}$$

$$\text{Mean:} \quad \frac{(45.1+69.6) \text{ minutes}}{2} = 57.4 \text{ minutes}$$

Sahu et al. (2013) assessed the effects of temperature on the productivity of 48 male rice harvesters in Bengal, India from April to June in 2011. Workers were paid on a piece-rate system, and their acclimatization status was not specified. They were allowed to take "small breaks (3-6 min) between work tasks [that] were included as part of the normal work time management" (p. 426). Productivity was assessed as the "hourly number of bundles divided by the number of workers to calculate the average hourly productivity per worker" (p. 426). The authors measured both T_a and WBGT in the farm fields and estimated the relationship between them (Figure 1, p. 427).

The authors only reported productivity as a function of WBGT (Figure 4, p. 428). First, the WBGT when productivity was highest (25.7°C) and lowest (30.9°C) was identified. Then the regression equation from Figure 1 was used to estimate T_a based on WBGT. Finally, to estimate RH, historical weather data "from the nearby weather station at Kolkata Dum-Dum airport" (p. 426) was used, upon which the authors had also relied. OSHA identified the days from April through June 2011 that matched the T_a for highest productivity (80.6°F) and lowest productivity (97.4°F) at 6:00 a.m. (when T_a was measured for the first hour of work), and then used the corresponding level of RH. This yielded an HI of 85.5°F for the REF condition (based on a T_a of 80.6°F and 80% RH), and an HI of 116.6°F for the HOT condition (based on a T_a of 97.4°F and 56% RH).

OSHA estimated productivity loss from the REF condition to the HOT condition based on the productivity data (rice bundles per hour) for the first hour of work in Figure 4 (p. 428). Workers harvested 92 rice bundles per hour at the REF condition (i.e., 100% productivity), and 63.8 bundles per hour at the HOT condition (i.e., 69% productivity). This yielded a rate of productivity loss of 1.00% per 1°F HI.

$$\frac{(100-69)\%}{|85.5-116.6|°\text{F}} = 1.00\% \text{ per } 1°\text{F HI}$$

The productivity loss at the initial heat trigger (80°F HI) is assumed to be 0% because the REF condition, at which productivity was assumed to be 100%, is higher than the initial heat trigger.

Relative to the REF condition (85.5°F HI), the productivity loss at the high heat trigger (90°F HI) is 4.50%. For an 8-hour work shift (480 minutes), this translates to a loss of 21.6 minutes.

$$\frac{1.00\%}{1°\text{F HI}} * (90 - 85.5)°\text{F HI} = 4.50\% \quad 4.50\% * 480 \text{ minutes} = 21.6 \text{ minutes}$$

III. Group 3 Studies.

Dally et al. (2018) assessed the effects of temperature on the productivity of 4,095 sugarcane cutters in Guatemala from November 2015 to May 2016. Workers received "a base wage regardless of the amount of sugarcane harvested" (p. 3) and were acclimatized (i.e., they completed a "one week acclimatization period in November" (p. 3). They worked a "ten-hour shift (p. 3) and were allowed to "take three 20-minute breaks and one 60-minute lunch break in the provided shade during the work shift" (p. 4). The authors reported daily productivity as the "average daily tons cut per workday" (p. 4). The authors collected data on T_a, RH, and WBGT using the Cengicaña weather station located close to the sugarcane fields.

Using historical weather data (collected at 15-minute intervals) from the Cengicaña weather station, T_a and RH were used to calculate HI for each day of the harvest season. OSHA identified the days with the highest and lowest HI based on the 75th percentile of each day, which provided the range of temperatures that most closely corresponded to the extreme values of daily productivity (as compared with mean HI or max HI). This yielded an HI of 88.3°F for the REF condition and an HI of 102.6°F for the HOT condition.

The productivity loss from the REF condition to the HOT condition was estimated based on the productivity data (tons of sugarcane per day) in Figure 2 (p. 7). Workers harvested 6.0 tons per day at the REF condition (i.e., 100% productivity), and 5.42 tons per day at the HOT condition (i.e., 90.3% productivity). This yielded a rate of productivity loss of 0.68% per 1°F HI.

$$\frac{(100 - 90.3)\%}{|88.3 - 102.6|°\mathrm{F}} = 0.68\% \text{ per } 1°\mathrm{F\ HI}$$

However, the sugarcane cutters were given a total of 60 minutes of rest breaks (3x20 minutes) over the course of a 9-hour work shift, while the proposed rule would require a total of 35 minutes of rest breaks (2x15-minute scheduled rest breaks and 5 minutes of rest breaks if needed) over the course of an 8-hour work shift at the high heat trigger. Therefore, OSHA assumed that the rate of productivity loss should be multiplied by 1.52, or the ratio of the percentages of the work shift spent in breaks for these two scenarios. This yielded an adjusted rate of productivity loss of 1.03% per 1°F HI.

Dally et al. (2018): $\frac{60\text{ min}}{540\text{ min}} = 11.1\%$ Proposed Rule: $\frac{35\text{ min}}{480\text{ min}} = 7.3\%$

$$\frac{11.1\%}{7.3\%} = 1.52$$

$$0.68\% * 1.52 = 1.03\% \text{ per } 1°\mathrm{F\ HI}$$

Relative to the REF condition (88.3°F HI), the productivity loss at the high heat trigger (90°F HI) is 1.75%. For an 8-hour work shift (480 minutes), this translates to a loss of 8.4 minutes.

$$\frac{1.03\%}{1°\mathrm{F\ HI}} * (90 - 88.3)°\mathrm{F\ HI} = 1.75\% \qquad 1.75\% * 480 \text{ minutes} = 8.4 \text{ minutes}$$

III. Findings of Primary Approach.

This appendix presents OSHA's estimates of the labor productivity loss resulting from pacing (i.e., working slowly during the work time not spent on breaks) when the heat index is equal to the initial and high heat triggers. This appendix also presents OSHA's estimates of the decrease in pacing with the introduction of if-needed and scheduled breaks—the findings of the primary approach suggest that employees pace less (i.e., work more efficiently) with if-needed rest breaks, and that scheduled rest breaks further reduce pacing (i.e., employees become even more efficient). These estimated labor productivity losses from pacing were translated to and presented as equivalent lost minutes of work time in an 8-hour work shift.

At the initial heat trigger, employees given if-needed rest breaks are estimated to pace less (i.e., work more efficiently) by an average of 2.8 minutes (per 8-hour shift) compared to those not given if-needed rest breaks. At the high heat trigger, employees given both scheduled and if-needed rest breaks are estimated to pace less (i.e., work more efficiently) by an average of 32.2 minutes (per 8-hour shift) compared to those not given neither if-needed nor scheduled rest breaks and by an average of 31.1 minutes (per 8-hour shift) compared to those given only if-needed rest breaks.

IV. Alternate Approaches Under Consideration.

OSHA has preliminarily determined that the assumptions made in the primary approach are plausible and appropriate. However, OSHA recognizes that the limited scope of available evidence affects the extent to which these key assumptions can be tested. For example, none of the available studies directly compared rest break policies in the same setting, so the estimates of cost savings are based on differences in productivity losses across settings. OSHA is considering alternate approaches with varying assumptions, such as the extent to which productivity losses in one setting, given a certain rest break policy, may be representative of such losses in other settings.

One alternate approach modifies some of the key assumptions made in the primary approach, while still relying on the same set of studies. Specifically, this approach retains Assumptions a) through d) and Assumption f), but it replaces Assumption e) with the following:

e.1. An employee's expected productivity loss from pacing, given a specific temperature and the employer's break policy, is estimated by taking the average REF condition observed in studies where that break policy is in effect, along with the average productivity loss per degree observed across all studies.

e.2. An employee's expected productivity gains from taking rest breaks do not exceed the productivity losses that are observed when they work at a slower pace and do not take rest breaks. In other words, if a rest break policy yielded an overall net increase in productivity, employers would already offer these rest breaks. Gains can be estimated by differences in productivity losses due to pacing, as measured at the initial temperature (i.e., trigger) at which the rest break policy goes into effect.

Compared with those of the primary approach, the above alternate assumptions are more relaxed in some ways and stronger in others. In particular, the assumption that productivity losses per degree are estimated in a pooled fashion, but REF conditions are not, implies that all productivity gains associated from reduced pacing come in the form of a shift in the productivity loss function. This assumption addresses the potential concern that differences in work conditions other than temperature (such as sun exposure or work demands) limit the applicability of any findings on productivity loss to other work settings.

Under this alternate approach, OSHA expects that productivity losses at the initial and high heat triggers will be larger for employees in Group 1, and they will be smaller for employees in Groups 2 and 3 (see Table VIII.H.A.2).[118] This means that under these assumptions, even greater cost savings could accrue to employers if they offered rest breaks if needed at the initial heat trigger, and scheduled rest breaks as well as if-needed rest breaks at the high heat trigger. OSHA welcomes feedback on this alternate approach and has not yet calculated how it would impact the total cost of the proposed standard.

Table VIII.H.A.2. Summary Table of Alternate Approach

Group	HI at REF (average within group)	Productivity Loss per 1°F HI above REF (pooled average for all groups)	Productivity Loss at Initial Heat Trigger	Productivity Loss at High Heat Trigger
1	73.7°F	0.71%	21.5 min	55.6 min
2	79.7°F	0.71%	1.0 min	35.1 min
3	88.3°F	0.71%	0 min	5.8 min

The average HI at REF uses the midpoint for each study in cases where a range was specified. The average productivity loss is the pooled average from Table VIII.H.A.1.

In both the primary approach and the secondary approach (immediately above), the REF condition—which is, loosely, the minimum temperature at which heat begins to

[118] Not reflected in Table VIII.H.A.2 is the possibility that the exclusion criteria listed in Table VIII.H.A.3 may need to be reconsidered if the cost savings estimation approach is revised.

cause productivity loss—is assumed to differ across Groups. The two estimation approaches diverge in that the per-degree rate of loss in conditions above REF is always 0.71% in the secondary approach but is allowed to differ by Group in the primary.[119] A tertiary approach would reverse which parameter is estimated in a pooled manner; the REF condition would be the same across Groups, while the per-degree rate of loss would differ. As shown in Table VIII.H.A.1., however, the per-degree rate of loss is estimated to increase with amounts of rest, so this approach would yield an estimate of productivity-related costs, rather than cost savings. Although this result is not plausible, it illustrates some of the uncertainties about data and quantitative methods used in this Appendix.

A pooled regression could address some of these challenges by producing a single estimate representing the relationship between temperature and productivity loss that does not differ by break policy, then separately producing estimates as to how each rest break policy might improve productivity. OSHA is considering an additional alternate approach that would incorporate regression analysis and might, as part of such analysis, relax the assumption regarding the linearity of the relationship between temperature and productivity loss. That is, a nonlinear specification could address the potential concern that productivity losses may become increasingly severe as the temperature exceeds the initial heat and high heat triggers.

119 However, allowing heterogeneity in the reference temperature has support in the literature; see Heutel et al. (2021).

In sum, OSHA welcomes feedback on the primary cost savings approach and the alternate approaches. OSHA also welcomes suggestions for other approaches to estimate cost savings related to the provision of rest breaks.

Table VIII.H.A.3. Studies Excluded from Pacing Estimates, Grouped by Reason for Exclusion

Study, Listed as Author(s) and Year	Study Identified By
Did not measure temperature conditions (n=2)	
Hostler et al., 2016	ERG 2022b
O'Neill et al., 2013	ERG 2022a
Assumed outdoor (forecasted) conditions applied to indoor workers (n=2)	
Cai et al., 2018	OSHA
Adhvaryu et al., 2020	ERG 2022c
Temperature conditions did not vary (n=5)	
Schlader et al., 2011	OSHA
Uchiyama et al., 2022	OSHA
Schranner et al., 2017	ERG 2022a
Constable et al., 1994	ERG 2022a
Morrissey-Bassler et al., 2024	OSHA
Temperature range was entirely below the initial heat trigger (n=3)	
Van Cutsem et al., 2015 (HI of 77°F for HOT condition)	OSHA
Federspiel et al., 2004 (HI of 78.8°F for HOT condition)	ERG 2022c
Niemelä et al., 2002 (HI of 77.2°F for HOT condition)	ERG 2022a
Temperature range was entirely above the high heat trigger (n=3)	
Meegahapola and Prabodanie, 2018 (HI of 90.1°F for REF condition)	ERG 2022c
Wyndham, 1969 (HI of 97.5°F for REF condition)	OSHA
Ismail, 2009 (HI of 92°F for REF condition)	ERG 2022c
Unable to reproduce temperature data (n=2)	
Masuda et al., 2021	ERG 2022c
Sett and Sahu, 2014	ERG 2022c
Review studies, no empirical productivity data (n=15)	
Ioannou et al., 2022	ERG 2022a
Borg et al., 2021	ERG 2022a
Dasgupta et al., 2021	ERG 2022a
Morrissey et al., 2021a	ERG 2022a
Morrissey et al., 2021b	ERG 2022a
Foster et al., 2020	OSHA
Morris et al., 2020a	ERG 2022a
Morris et al., 2020b	ERG 2022b
Day et al., 2019	ERG 2022a
Flouris et al., 2018	ERG 2022a
Lundgren et al., 2013	ERG 2022c

Seppänen et al., 2006	ERG 2022c
Pilcher et al., 2002	ERG 2022c
Hancock et al., 2007	OSHA
Lai et al., 2023	OSHA
Modelling studies, no empirical productivity data (n=19)	
Casey et al., 2021	OSHA
Szewczyk et al., 2021	ERG 2022a
Atlantic Council/Vivid Economics 2021a	OSHA
Atlantic Council/Vivid Economics 2021b	OSHA
Atlantic Council/Vivid Economics 2017	OSHA
Bröde et al., 2018	ERG 2022c
Takakura et al., 2017	ERG 2022a
Carleton and Hsiang, 2016	ERG 2022a
Costa et al., 2016	OSHA
Yi and Chan, 2015	ERG 2022b
House et al., 2003	ERG 2022b
Kjellstrom et al., 2009a	ERG 2022a
Koehn and Brown, 1985	ERG 2022c
Srinavin and Mohamed, 2003	ERG 2022c
International Labour Organization, 2019	OSHA
Kjellstrom et al., 2016a	OSHA
Kjellstrom et al., 2009b	OSHA
Kjellstrom et al., 2017	OSHA
Kjellstrom et al., 2016b	OSHA
Outcome was heat strain (n=5)	
Wyndham, 1965	OSHA
Kalkowsky and Kampmann, 2006	OSHA
Miller et al., 2011	OSHA
Ioannou et al., 2021a	ERG 2022a
Kaltsatou et al., 2020	ERG 2022b
Outcome was physical activity or maximum work capacity (n=2)	
Mix et al., 2019	OSHA
Maresh et al., 2014	OSHA
Outcome was cognitive performance (n=3)	
Fine and Kobrick, 1987	ERG 2022c
Mazlomi et al., 2017	ERG 2022c
Spector et al., 2018	ERG 2022c
Outcome was heat-related injuries (n=1)	
Park et al., 2021	ERG 2022a

Outcome was loss of labor supply (including missed work hours) (n=2)	
Neidell et al., 2021 (ATUS)	ERG 2022a
Graff-Zivin and Neidell, 2014 (ATUS)	ERG 2022a
Outcome was non-working time (n=5)	
Flouris et al., 2020 (unplanned break time)	ERG 2022a
Ioannou et al., 2021b (unplanned break time)	ERG 2022c
Yi and Chan, 2017 (non-productive time)	ERG 2022c
Li et al., 2016 (idle time)	ERG 2022c
Zhao et al., 2009 (heat tolerance time)	OSHA
Outcome was payroll or income data (n=3)	
Deryugina and Hsiang, 2014	ERG 2022c
Park, 2016	ERG 2022c
Heal and Park, 2013	OSHA
Outcome was crop yields (n=1)	
Houser et al., 2014	OSHA
Outcome was firm-level output (no worker-level data available) (n=1)	
Cachon et al., 2012	ERG 2022c
Productivity losses were self-reported (e.g., surveys, focus groups) (n=9)	
Krishnamurthy et al., 2017	ERG 2022c
Zander et al., 2015	ERG 2022c
Langkulsen et al., 2010	ERG 2022c
Fahed et al., 2018	ERG 2022c
Budhathoki and Zander, 2019	ERG 2022c
Singh et al., 2015	ERG 2022c
Pogačar et al., 2019	ERG 2022c
Morera et al., 2020	ERG 2022a
Wadsworth et al., 2019	ERG 2022a
Provided single productivity estimate for a range of temperatures (n=6)	
Sadiq et al., 2019	ERG 2022c
Hansson et al., 2024	OSHA
Glaser et al., 2022	ERG 2022b
Prince et al., 2020	ERG 2022b
Wegman et al., 2018	ERG 2022b
Bodin et al., 2016	ERG 2022b
Provided single productivity estimate for multiple worksites with different conditions (n=2)	
Stevens, 2017	OSHA
Gun and Budd, 1995	ERG 2022c
Productivity data not comparable; workers observed or total work time varied (n=3)	

Sawka et al., 2015	OSHA
Nag et al., 2006	OSHA
Morrison, 1969	OSHA
Productivity data for firefighting tasks only (n=2)	
Larsen et al., 2015	ERG 2022c
Sol et al., 2021	ERG 2022c
Provided breaks but did not specify type (scheduled vs. if-needed) or duration/frequency (n=4)	
Mitchell et al., 2018	ERG 2022c
Quiller et al., 2017	ERG 2022c
Ciuha et al., 2019	ERG 2022c
Pan et al., 2021	ERG 2022a
Used work-time shifting instead of breaks (n=1)	
Morabito et al., 2020	OSHA

I. Appendix B. Review of Literature on Effects of Heat Exposure on Non-Health Outcomes.

I. Introduction.

A large literature from multiple disciplines (economics, occupational health, physiology) documents the negative effects of heat exposure on human health, such as mortality, injuries, and illnesses (for detailed discussion, see Section IV., Health Effects and Section V.A., Risk Assessment).

There is also a large literature that documents the negative effects of heat exposure on a broad range of non-health outcomes with potential economic implications (Heal and Park, 2016; Lai et al., 2023).

This document serves several purposes. First, this document synthesizes and summarizes the findings from multiple disciplines regarding the effects of heat exposure on non-health outcomes with potential economic implications. In particular, this document aims to examine a broad set of non-health outcomes that are potentially relevant to OSHA's economic analysis for the proposed standard for Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings. Although the discussion centers around labor productivity, other outcomes are also discussed, including but not limited to labor supply, mental performance, economic output, and worker utility. This document also aims to clarify terminology, given that different terms have been used interchangeably in the existing literature (Dasgupta et al., 2021, p. e457).[120]

Studies summarized in this document were identified as follows. Eastern Research Group (ERG) performed several literature searches (ERG, 2022a; ERG, 2022b; ERG, 2022c) that could inform the relationship between heat and various outcomes (e.g., labor productivity, heat strain). Among these studies, studies reporting non-health outcomes were considered relevant. Studies reporting health outcomes like heat strain and work-related HRIs were not considered relevant, and readers are referred to relevant sections of the preamble for more detail. OSHA also independently identified additional studies pertaining to non-health outcomes. During this process, studies about general population-related outcomes (e.g., heat-related mortality for general population beyond workers) were considered irrelevant.

[120] For example, Burke et al. (2023) conducted a meta-analysis of 22 studies as part of their literature review of existing evidence of "labor productivity response to temperature." Some of these studies reported effects on mental performance or effects on economic output without clearly delineating the contribution of labor productivity. Changes in mental performance (e.g., error rates) may not directly reflect the magnitude of changes in labor productivity; for example, a 50% decrease in the error rate does not necessarily mean a 50% increase in labor productivity (Fisk, 2000, pp. 555–556). Flouris et al. (2018) conducted a meta-analysis of 111 studies on the effects of heat exposure on workers' outcomes, 11 of which were related to "productivity loss." Some of these studies reported effects on self-perceived labor productivity or labor supply.

This document is organized as follows. Section VIII.I.II. summarizes the literature's findings on the negative effects of heat exposure on non-health outcomes with potential economic implications, especially labor productivity. Section VIII.I.III. summarizes the literature's findings on the role of workplace characteristics in the labor productivity effects of heat exposure. Section VIII.I.IV. concludes.

II. Effect of Heat Exposure on Non-Health Outcomes.

This section summarizes the literature's findings on the negative effects of heat exposure on non-health outcomes that could translate into economic costs: labor supply, labor productivity, mental performance, economic output, and worker utility.[121]

A. Labor Supply.

Literature has documented the negative effects of heat exposure on labor supply (hours worked), by increasing absenteeism due to illness or injury (Ioannou et al., 2022, p. 80) or increasing disutility of labor (working in the heat causes discomfort so workers increasingly avoid spending time at work at higher temperatures) (Lai et al., 2023, p. 222).

Many studies found that heat exposure increased absenteeism due to illness or injury in their evaluation of multiple types of health information datasets, such as workers' compensations claims data, emergency department visits and hospital discharge datasets (for more detail, see Section IV., Health Effects and Section V.A., Risk Assessment).

[121] In general, the findings in this appendix (and other PEA sections that discuss benefits that are excluded from the primary benefits quantification) may be interrelated, such that simply summing the effects identified could lead to some amount of double-counting or other mis-counting.

Many studies in the economics literature found evidence that heat exposure led workers to allocate less hours to work (potentially due to absenteeism from illness or injury, increased disutility of work, or both). Graff Zivin and Neidell (2014) used data from the American Time Use Survey (ATUS) to find that workers in "high-risk industries" (agriculture, forestry, fishing, hunting, mining, construction, manufacturing, transportation, utilities) reduced their time allocated to labor by one hour when daily maximum ambient temperatures exceeded 85°F (29.4°C) compared to the 76°F–80°F (24.4°C–26.7°C) range. Almost all the decrease in the time allocated to labor happened at the end of the day when fatigue from prolonged exposure to heat has likely set in. They also found that that most of the decreased time allocated to labor was diverted to indoor leisure. They did not find evidence that workers worked longer during cooler days to make up for reduced work hours during hot days. Rode et al. (2022) compiled time use and labor force survey data from seven countries (Brazil, France, India, Mexico, Spain, UK, USA) and found that a day at daily maximum ambient temperature 104°F (40°C) lead to 28.65 fewer minutes worked per worker compared to a day at 80.6°F (27°C) for "high-risk industries" (agriculture, mining, construction, manufacturing); the corresponding decline was insignificant for workers in "low-risk industries" (p. 21). Garg et al. (2020a) found in Chinese time use survey data that an additional day with an average ambient temperature above 80°F (26.7°C) reduced weekly work time by 1.2

hours. They also found limited evidence for this reduced work time being substituted by increased non-work time such as time spent on childcare and household chores.[122]

The effect of heat exposure on labor supply likely depends on the incentive structures[123] for these workers and their economic dependence on the income arising from their work (Lai et. al., 2023). Using daily attendance records from selected manufacturing firms in India, Somanathan et al. (2021) found that elevated temperatures in the current or preceding week reduced labor supply[124] (which the authors interpreted as possibly both increased absenteeism from illness or injury and increased disutility of labor), and the effect was stronger for workers with paid leave. Such dependence on specific incentive structures might explain the differences in results across studies. For example, Cai et al. (2018) examined worker attendance data from administrative records and found that neither the attendance decision nor the working hours of workers in a manufacturing facility in China were affected by temperature, likely because the workers were paid by piece-rate. Neidell et al. (2021) found in ATUS data that the relationship between hours worked and temperature depended on overall economic conditions. They found that during economic expansions, each additional degree above daily maximum ambient temperature 90°F (32.2°C) reduced the average workday by 2.6 minutes. On the other hand, no significant relationship was found between temperature and hours worked

[122] The authors found that higher temperatures reduce time spent on childcare by households without cooling technology (insignificant effect on households with cooling technology). They also found that higher temperatures reduce time spent on childcare by women (insignificant effect for men).
[123] The role of workplace incentives in the labor productivity effects of heat exposure is discussed later in Section VIII.I.III.B.
[124] This study's worker attendance data technically measures only whether the worker is present or absent that day (Somanathan et al., 2021, p. 1811). It is unclear if and how their attendance data captures cases where the worker is only partially present, and leaves work early that day.

during economic recessions. Such lack of evidence of reduction in work hours on hotter days during weak labor market conditions suggests that the negative relationship between temperature and work hours is likely driven by changes in labor supply (from worker) rather than labor demand (from employer).

There are several reasons for the need for caution in interpreting the studies reporting effects of heat exposure on labor supply (or employment in general).

First, the results presented in most of these studies could be driven by changes in labor demand as well as labor supply (Graff Zivin and Neidell, 2014, p. 4). Some studies did try to differentiate labor supply and demand, such as estimating the effect across business cycles (Neidell et al., 2021) or estimating wage effects as well as employment effects (e.g., Colmer, 2021; Jessoe et al., 2018).

Second, most economics studies reporting the negative effect of heat exposure on labor supply using data on hours worked did not disentangle the contribution of absenteeism due to illness or injury from the contribution of disutility from working in the heat. The distinction is important because improving workplace conditions may increase labor supply beyond reducing time lost to illness or injury.

Third, it is not very clear if reduced work time always has negative implications for worker welfare. Reduced work time on hot days such as cessation of work might be beneficial for workers if fewer workers are exposed to high temperatures that put their health at risk (Ireland et al., 2024, p. 18). However, if the lost work time is not compensated, workers face a tradeoff between health risk and earnings risk, both of which negatively affects the workers' welfare (EPA, 2021, p. F-3). Rode et al. (2022)'s theoretical framework also presented a similar tradeoff facing workers between decreased earnings and increased disutility of labor in face of higher temperatures. Their theoretical framework is based on their interpretation of their empirically-estimated decline in labor supply due to higher temperatures (discussed above) as uncompensated lost work time—workers choose to work less due to increased disutility of labor but at the cost of foregoing earnings. Based on this theoretical framework, they derived the willingness-to-pay to avoid the increased disutility of labor from higher temperatures (defined as the increase in the wage rate that is needed to offset the increased disutility of labor).

Fourth, the definition of work hours varies by dataset. Some datasets include, for example, paid or unpaid leave (Somanathan et al., 2021) or while other datasets include time spent on job search.[125] (studies that use the ATUS such as Graff Zivin and Neidell, 2014; Neidell et al., 2021; Rode et al., 2022). How work hours are defined has implications for the worker welfare effects of heat exposure. For example, as discussed above, worker welfare could depend on whether the reduced work hours from heat exposure are compensated (e.g., worker leaves work early forgoing pay versus using paid leave). See Eldridge et al. (2022) for more examples of various definitions of work hours across datasets.

B. Labor Productivity.

[125] Using the ATUS and following the “same methodology employed by” Graff Zivin and Neidell (2014). Neidell et al. (2021) defined “work” as “all activities under the ‘work and work-related activities’ major category,” which “in addition to time spent at the workplace, […] also includes time devoted to other income-generating activities as well as job searching” (p. 2). Rode et al. (2022) also uses the same category to calculate time spent on work: “Total work is calculated as the sum of all time spent engaged in sub-activities listed under Category 5, Work and Work-Related Activities. Relevant sub-categories include time spent in work itself, income-generating activities, socializing as a part of work, job searching, and other miscellaneous work-related activities” (p. 52).

Numerous studies have documented the negative effects of heat exposure on labor productivity. Using direct measures of labor productivity (units of output produced per hour) and proxies of labor productivity (physical work capacity, physical activity, and self-perceived labor productivity), studies across various disciplines (e.g., physiology, occupational health, and economics) have found that heat exposure reduces labor productivity (Ioannou et al., 2022; Morrissey et al., 2021a; Mattke et al., 2007).

This section focuses on micro-level evidence across various disciplines based on laboratory or occupational settings. Studies reporting potential macro-level evidence on labor productivity based on macroeconomic proxies of labor productivity (e.g., per capita value added, revenue, payroll) are discussed in Section VIII.I.II.D.

Overall, studies reported varying estimates of effects of heat exposure on labor productivity depending on the specific sectors and heat conditions (e.g., presence of indoor radiant heat, differences in regional climate between the U.S. and non-U.S. countries). Section VIII.I.III. discuses in more detail workplace factors that affect the literature's estimates of the effect of heat exposure on labor productivity, such as contractual structures and adaptation measures that affect workers' incentives and ability to be productive in the heat.

I. Direct Measures of Labor Productivity.

Labor productivity is a "measure of economic performance that compares the amount of goods and services produced (output) with the amount of labor hours worked to produce that output" and is a "ratio of output to hours worked" (BLS, 2020a). Changes in labor productivity "reflect the changes in output that is not explained by the change in hours worked" (BLS, 2020a). Studies have documented the effects of heat exposure on labor productivity in different work settings in both U.S. and non-U.S. countries. Most of these studies are occupational studies with the exception of one laboratory-based study involving simulated work.

Some studies discussed in this section technically reported changes in an average worker's output per day or week, not output per hour. These studies are discussed in this section in the context of labor productivity based on their evidence that changes in their reported outcomes are likely being driven by changes in worker output per hour, not by changes in daily or weekly hours worked.

a. Agriculture.

Many studies analyzing the labor productivity effects of heat exposure are based on agricultural work settings, given the agricultural sector's high level of heat exposure and the feasibility of tracking individual production levels.

Using daily production data of Indian rice harvesters, Sahu et al. (2013) reported a 5% decline in labor productivity (rice bundles per worker per hour) for each additional degree above 26°C WBGT. Using daily production data of sugarcane cutters in Nicaragua, Hansson et al. (2024) reported that relative to below 82.4°F (28°C) WBGT, labor productivity (bundles per worker per day) decreased by 2.5% at 82.4°F–84.2°F (28°C–29°C) WBGT, by 5% at 86°F–87.8°F (30°C–31°C) WBGT, and by 8.3% at above 87.8°F (31°C) WBGT. Using daily production data of maize farmers in Nigeria, Sadiq et al. (2019) reported that for every 1.8°F (1°C) increase in WBGT, labor productivity (ridges tilled or hoed per worker per hectare) decreased by 23% although their reported labor productivity effects of higher temperature could be confounded by the effects of fatigue over the workday. Using daily production data of sheep shearers and retrospective temperature records of a "Bureau of Meteorology recording station" in Australia, Gun and Budd (1995) reported that the labor productivity (number of sheep shorn per worker per hour) declined by approximately 7% per 1.8°F (1°C) increase in ambient temperature[126] although the estimated effect was not statistically significant. Using daily production data of Guatemalan sugarcane workers, Dally et al. (2018) reported that a day with 95th percentile WBGT of 34°C was associated with an estimated cumulative loss in labor productivity of 0.59 tons of cut sugarcane per worker per day over the following five days compared to a day with 95th percentile WBGT of 29°C (approximately 0.59/5.7=10.35% of the average production per worker per day).

Based on data from tree fruit harvesters in Washington state, Quiller et al. (2017) found that increasing daily maximum WBGT was associated with decreasing labor productivity (weight of fruit bins collected per worker per hour). However, this association became statistically insignificant after controlling for potential confounders such as price paid per bin and shift duration. The lack of evidence could also be due to relatively cool climate of Washington state—the time-weighted average WBGT was 72.1°F (22.3°C) and 60.6°F (15.9°C) in each of the months studied.

b. Manufacturing.

Several studies that directly measure labor productivity are based on manufacturing settings, likely due to feasibility of tracking individual production levels.

[126] This corresponds to a linear approximation of the results presented in Figure 5 of the study.

Using daily production data from a non-climate-controlled paper cup manufacturing setting in China, Cai et al. (2018) reported that daily maximum ambient temperatures above 95°F (35°C) resulted in an approximately 8.5% decrease in labor productivity (output per worker per day) relative to the baseline range of 75°F–79°F (23.9°C–26.1°C). Using daily production data from a rubber compound manufacturing plant in Sri Lanka, Meegahapola and Prabodanie (2018) reported that high temperature ranges, 105.8°F–113°F(41°C–45°C) and 96.8°F–104°F (36°C–40°C), reduced labor productivity (kilogram per worker per hour), by 22% and 18% respectively, relative to the baseline temperature range of 89.6°F–95°F (32°C–35°C). Using weekly production data of brick molders and carriers in India, Sett and Sahu (2014) found that for each 1.8°F (1°C) increase in ambient temperature, labor productivity (number of bricks molded or carried per worker per week) declined by 0.8%. Using daily worker-level production data from selected manufacturing firms in India, Somanathan et al. (2021) found that labor productivity (output per worker per day) declines in higher outdoor temperatures, falling 2.7% per 1.8°F (1°C) increase in daily maximum ambient temperature above 77°F (25°C).

c. Other Sectors.

Direct units of output are harder to measure in most other sectors, so comparatively fewer studies have been produced in other industries.

Observing call center workers in California, Federspiel et al. (2004) found that time to finish tasks (post-talk wrap-up to process information) increased by 16% when the ambient temperature increased from 73.4°F to 77.7°F (23°C to 25.4°C). Niemelä et al. (2002) also analyzed workers at two call centers. In one call center, they compared labor productivity (number of calls per hour) between two different temperature zones in the building. In another cell center, they introduced an intervention (installation of air-conditioning) and compared labor productivity before and after the intervention. They reported that labor productivity in both call centers decreased by 5% to 7% at ambient temperatures over 77°F (25°C), although other seasonal changes likely confounded their results. From data on Demographic and Health Surveys (DHS) interviewers from 46 developing countries, LoPalo (2023) estimated the effects of heat exposure on DHS interviewers' labor productivity (number of surveys completed per hour). Exploiting variation in weather within a region of a country, survey waves, and interviewers, they found interviews per hour were fewer by 13.6 % on days over 85°F (29.4°C) wet bulb relative to days between 50°F (10°C) and 60°F (15.6°C) wet bulb. Hanna (2004) conducted an experiment in an environmental test chamber with journeymen electricians installing duplex receptacles on work panels. While their laboratory setting did not allow effects of real-world workplace factors that affect labor productivity, the controlled environment tracked heat exposure in detail by ambient temperature and humidity level. The study found that maximum labor productivity (number of receptables installed per hour) was achieved at ambient temperature between 40°F (4.4°C) and 70°F (21.1°C) with relative humidity below 80%. At 70% relative humidity, labor productivity decreased by 10% when ambient temperature increased from 70°F (21.1°C) to 90°F (32.2°C) (and by 23% when ambient temperature increased to 100°F (37.8°C)). They also found that higher relative humidity reduced labor productivity further at elevated ambient temperatures.

II. Proxies for Labor Productivity.

This section summarizes findings of studies that report “alternative” measures of labor productivity, such as physical work capacity, physical activity, and self-perceived labor productivity.

a. Physical Work Capacity, Exposure-Response Functions.

Work capacity or physical work capacity is the potential to perform work under specified set of environmental conditions (e.g., WBGT) and physical condition of the worker (e.g., core body temperature, heart rate) (Ioannou et al., 2022, p. 75; Bröde et al., 2018, p. 332). Loss of work capacity occurs as a physiological response to heat exposure where the worker reduces physical activity to avoid negative health effects (e.g., increases in core body temperature or heart rate beyond the safe limit) (Kjellstrom et al., 2014).

Several studies have derived exposure-response functions that represent the relationship between heat exposure and work capacity. Exposure-response functions in the occupational health literature fall into two groups (Borg et al., 2021). The first group of exposure-response functions are based on empirical data (e.g., Kjellstrom et al., 2014; Foster et al., 2021). The second group are based on recommended work-rest ratios in existing work-rest guidelines by NIOSH, ACGIH, and ISO (e.g., Kjellstrom et al., 2009b; Dunne et al., 2013).

b. Empirically-Derived Exposure-Response Functions.

As part of the High Occupational Temperature Health and Productivity Suppression (Hothaps) Programme, Kjellstrom et al. (2014) derived an exposure-response function (henceforth "Hothaps function") linking WBGT to work capacity for three levels of work intensity (200 W, 300 W, 400 W) based on the empirical data involving acclimatized male workers in Wyndham (1969) (miners in South Africa) and Sahu et al. (2013) (rice harvesters in India).

Foster et al. (2021) derived an exposure-response function (henceforth "PWC function") linking varying environmental conditions to work capacity based on empirical data collected from one-hour trials involving young, unacclimatized males performing physical work in climatic chambers. In this study, work capacity is defined as the "maximum physical work output that can be reasonably expected from an individual performing moderate to heavy work over an entire shift." More specifically, Foster et al. (2021) aimed to measure the amount of work that can be performed across varying environmental conditions (e.g., combinations of air temperature and relative humidity) while maintaining a fixed heart rate at a maximally acceptable level (e.g., 130 beats per minute) as a "surrogate for self-paced physical workloads." Smallcombe et al. (2022) replicated the environmental conditions of Foster et al. (2021) and computed work capacity during 6 work-rest cycles of 50-minute work/10-minute rest, with a 1-hour break after the first 3 cycles.

There are some benefits of evaluating the work capacity effects of heat exposure. Heat exposure-work capacity response functions (exposure-response) could be applied to macroeconomic data and models to estimate the economic impact of heat exposure (more examples of studies that borrow these exposure-response functions are discussed more detail below in Section VIII.I.II.D.II.). Like Foster et al. (2021) and Smallcombe et al. (2022), work capacity could also be measured through laboratory experiments in controlled environments, reducing the influence of confounders and making their results generalizable across various environmental conditions.

However, there are caveats with interpreting the effects of heat exposure on work capacity reported in the studies above.

First, they may underestimate the labor productivity effects observed in actual work settings for several reasons (Ioannou et al., 2022). Heat exposure could reduce labor productivity not only through reduced work capacity but also other factors such as increased central fatigue and reduced cognitive performance. Also, as discussed more below in Section VIII.I.III.B., workplace factors such as wage structure may not always incentivize workers to sustain high levels of effort at the maximum capacity every day throughout the entire shift.

Second, these studies may also overestimate the labor productivity effects observed in actual work settings where self-pacing is more limited. Although self-pacing is observed in most workplaces, there are some workplaces where ability to self-pace is limited, such as emergency response activities or work performed on commission (Ioannou et al., 2022).

Third, some studies assume what is the physically maximally acceptable level (e.g., 130 beats per minute) which may not be appropriate for every worker. From the perspective of applying their findings to actual work settings, "it is not clear how various physiological (dehydration, cardiac fatigue, poor sleep quantity/quality) and psychological (motivation, anxiety) states impact upon what a worker deems as an acceptable working heart rate" (Ioannou et al., 2022).

c. Guideline-Based Exposure-Response Functions.

The second group of exposure-response functions are based on recommended work-rest ratios in existing work-rest guidelines set by NIOSH, ACGIH, and ISO (e.g., Kjellstrom et al., 2009b; Dunne et al., 2013).

There are several reasons for the need for caution when interpreting the guideline-based exposure-response functions.

First, work-rest guidelines represent the "the proportions of work hours during which workers need to take rest periods, depending on work intensity and WBGT, in order to avoid the core body temperature exceeding 38°C for an average worker" (Kjellstrom et al., 2009a). Exposure-response functions based on work-rest guidelines are "highly conservative because their objective is to minimize the risk of core body temperature of the average worker exceeding 38°C" (Foster et al., 2021). Guideline-based exposure-response functions therefore show greater declines in work capacity in higher temperatures than the empirically-derived functions (Kjellstrom et al., 2014, p. 17; Morrissey et al., 2021a, Figure 3).

Second, work-rest guidelines prescribe how much a worker should reduce their work capacity at different levels of heat exposure. They do not represent the causal effect of heat exposure on work capacity (Foster et al., 2021, p. 1216).

d. Physical Activity.

Some studies tracked the participants' level of physical activity, based on methods such as direct observation of work activities (that are then categorized into direct work, indirect work, and idle time), time-motion analysis (video recording movements that are then paired with metabolic equivalents) and accelerometers tracking data (step counts per minute which are also paired with metabolic equivalents). Although these methods do not directly track any effects on output, they measure changes in levels of labor input. A major advantage of these methods is that study participants are monitored in their actual working conditions, reflecting behavioral thermo-regulation (e.g., self-pacing and varying clothing insulation) and endogenous changes in effort in response to workplace incentives like piece-rate pay (Ioannou et al., 2022).

Li et al. (2016) and Yi and Chan (2017) directly observed rebar construction workers whose activities are categorized into direct work (activities that directly and productively contribute to task completion, i.e., steel bar reinforcement), indirect work (support activities that do not directly or productively contribute to task completion, such as walking with tools/materials or empty-handed, waiting for materials to be lifted, discussing tasks with foreman/coworkers), or idle time (personal time and non-utilization time due to work stoppage from any cause). Observing the activities of rebar construction workers in Hong Kong, Yi and Chan (2017) found that a 1.8°F (1°C) increase in hourly average WBGT was associated with an approximately 2.8 percentage-point (%p) decrease in the share of direct work time (corresponding to 2.8/64 = 4.38% of the average share of direct work time[127]; effects on the rest of the categories were not reported). Observing the activities of rebar construction workers in China, Li et al. (2016) reported that a 1.8°F (1°C) increase in hourly average WBGT was associated with a 0.57%p decrease in the share of direct work time (corresponding to 0.57/74 = 0.77% of the average share of direct work time) and a 0.74%p increase in the share of idle time (corresponding to 0.74/11 = 6.72% of the average share of idle time) (0.18%p decrease was also observed in the share of indirect work time, but the effects were not significant). Unlike Yi and Chan (2017) that controlled for when the temperature was measured during the workday, a caveat with Li et al. (2016) is that their reported effects of higher temperatures could be confounded by effects of fatigue over the workday.

Using time-motion analysis on a sample of construction workers in Spain over two days, Flouris et al. (2020) found that the workers take longer irregular breaks during the hotter day, Day 1 with a WBGT range 71.2°F–99.1°F (21.8°C–37.3°C). They found a 4.7-fold difference between the time lost due to irregular work breaks on a hot day (Day 1) compared to a cool day (Day 2), with a WBGT range 71.4°F–88.9°F (21.9°C–31.6°C). Moreover, they also found that a planned break intervention providing hydration to workers could partially offset these irregular breaks.

Mitchell et al. (2018) used accelerometer data to track the physical activity of Californian farmworkers for one work shift each in the summers of 2014 and 2015. They

[127] The study's abstract reported the share of direct work time "decreasing by 0.33%" per 1.8°F (1°C) WBGT increase—OSHA conjectures that this statement meant that the estimated 2.8%p decrease is 3.3% of the predicted average share of direct work time at 22.28°C WBGT (lowest observed WBGT in their data) according to their regression model where the covariates are held at their sample average values (some of which are not reported in the study).

found that an 18°F (10°C) increase in median WBGT reduced physical activity by 135 counts per minute compared to an average of 347 counts per minute across all participants (equivalent to a 3.9% decrease per 1.8°F (1°C) WBGT).

There are some caveats with using physical activity as a measure of labor productivity.

First, physical activity measures the amount of labor inputs instead of actual output. Some studies such as Ioannou et al. (2022) considered the focus on labor inputs rather than production output as an advantage; for instance, expressing labor productivity as the amount of crop produced implies constant availability and equal distribution of crops across the tested piece of land. However, changes such as unequal crop availability are not problematic unless they are systematically correlated with changes in heat exposure.

Second, for studies based on accelerometer data, without information if other production inputs exist and how they affect output (e.g., capital), the relationship between physical activity (counts per minute) and labor productivity is uncertain. For example, suppose there are two workplaces exposed to the same temperature and workers display the same level of physical activity but one workplace has machines that assist the workers. Given the same level of temperature and physical activity, the workplace that has machines available could achieve higher labor productivity.

e. Self-Perceived Labor Productivity.

Based on worker surveys, some studies document effects of heat on self-perceived labor productivity, partly due to the comparative ease of obtaining such measurements.

Compared to actual production data, the self-perceived measures are a less accurate measure of output and can be affected by other factors that impact an individual's self-perceived labor productivity, such as individual's level of awareness of heat stress.

Krishnamurthy et al. (2017) administered a standardized high occupational temperature health and productivity suppression questionnaire to 84 steel factory workers in India. Overall, 1% reported taking sick leave due to heat, 10.6% reported being less productive due to heat, and 27% reported that it took longer to complete the same tasks during summer compared to cooler seasons. Of the 27% who reported labor productivity losses, 91% were exposed to direct radiational heat during steel melting. This reduction in labor productivity occurred due to high heat and heavy workload despite taking rest breaks allowed by the management after the hot job was performed (work-rest regimen: 75% work, 25% rest, each hour). Workers reported drinking high quantities of water and rested in shade, but these actions did not abate the effects of heat due to the high ambient humidity which limits sweat evaporation and evaporative cooling. This study did not have a direct control group to compare the actual efficacy of these cooling mechanisms.

Zander et al. (2015) conducted an online survey of 1,726 Australian workers and found that 70% of all surveyed workers reported productivity losses due to heat, corresponding to the majority (93%) of those that reported being stressed by heat at work. In comparison, 7% of respondents reported being absent from work at least one day in the previous 12 months due to heat, being absent for 4.4 days on average. Also focusing on understanding the impact of heat on Australian workers, Singh et al. (2015) interviewed key stakeholders (representatives for occupational safety and health, unions, industry, and government organizations) that reported labor productivity loss due to heat exposure, but the results were mostly qualitative and based on a small sample of 20 stakeholders.

Pogačar et al. (2019) surveyed 70 workers in Greece and 216 workers in Slovenia and found that most workers in both Greece (69%) and Slovenia (71%) reported that they felt heat stress during heat waves had a "significant impact" on their productivity. Additionally, 60% of workers in Greece and 74% in Slovenia reported that heat stress significantly impacts their “well-being.”[128] These two studies did not directly track the actual temperature exposure of these workers and instead relied on the workers’ own recollection of the workplace temperatures (e.g., “warm,” “hot,” “very hot”).

Langkulsen et al. (2010) analyzed a total of 21 Thai workers from four industrial sites and one agricultural site. Onsite measurements found that the workers were exposed to WBGT ranging from 78.8°F to 94.3°F (25.6°C to 34.6°C). For 4 of the 5 sites, the study assessed the workers' self-perceived labor productivity, which revealed large differences between sectors. While workers in 2 of the 4 sites that assessed self-perceived labor productivity reported losses of self-perceived labor productivity ranging from 10% to 60%, workers in the other two sites reported no losses when exposed to similar heat (e.g., agriculture). In general, the largest losses in self-perceived labor productivity were from sites that had access to shade and indoors, even sites with air-conditioning in some cases. The small sample size across diverse sites may limit the ability to generalize these results.

[128] Authors are not specific what “well-being” means.

Surveying farmers in Nepal, Budhathoki and Zander (2019) reported that perceived labor productivity loss was strongly associated with the perceived levels of heat stress. Moreover, respondents with “access to actual weather information”[129] were more likely to perceive labor productivity losses from heat than those without this information, indicating that level of individuals' awareness potentially affects their self-reported assessments of labor productivity.

III. Occupational versus Laboratory Settings.

Studies discussed above in Sections VIII.I.II.B.I. and VIII.I.II.B.II. were conducted either in occupational settings or laboratory settings. Both settings have advantages and disadvantages.

Laboratory settings grant a high degree of internal validity because the experiments are more easily reproducible and represent a direct causal effect on heat that removes the influence of confounders (Ioannou et al., 2022). While laboratory-based studies provide a relevant benchmark for the effects of heat on productivity observed in actual work settings, they are limited in the generalizability of their findings to different settings (Somanathan et al., 2021). In occupational settings, labor productivity effects of heat would depend on the physical and behavioral aspects of employment, such as the wage contract, particularities of production processes, management techniques, and mechanization, which are not accounted for by laboratory studies (Somanathan et al., 2021).

C. Mental Performance (Cognitive Function, Decision-Making).

[129] Authors are not specific what “access to actual weather information” means.

The literature has documented the effect of heat exposure on mental performance in academic, athletic, and work settings.[130] These studies often use the term "performance" with the intent to "include a broader range of effects [such as test scores] than would be indicated by [labor] productivity" (Heal and Park, 2013, p. 10).

In a meta-analysis of 22 studies categorized into reaction time, attention/perceptual tasks, mathematical processing, or "reasoning, learning, memory," Pilcher et al. (2002) reported that a WBGT of 90°F (32.2°C) or greater was associated with a 14.9% decrease in performance compared to "neutral temperature conditions" defined as WBGT from 60°F to 69°F (15.6°C to 20.6°C). Moreover, they also report that these estimates are also affected by the duration of exposure to the heat conditions, the duration of exposure prior to the task onset, the type of task, and the task duration, which can explain the variability of results in the literature discussed below (test scores, athletic performance, workplace performance).

I. Test Scores.

Several studies found negative effects of heat exposure on cognitive test performance.[131] Using student-exam level panel data of high school exit exam scores

[130] Reduced mental performance due to heat exposure (e.g., mistakes, inattention, long reaction time) is also linked to increased heat-related injuries—for a detailed discussion, see Section IV.P., of this preamble, Heat-Related Injuries.

[131] Literature has also found evidence of heat exposure on longer-term outcomes such as student learning and adult earnings. Cho (2017) reported effects of summertime heat exposure on national college entrance exam scores in South Korea (administered nationwide in November). Park et al. (2020) reported effects of cumulative heat exposure from hotter days during the prior school year on PSAT exam scores of U.S. high school students. Garg et al. (2020b) reported effects of hotter days during the prior school year on academic achievement for Indian children in primary and secondary school. Isen et al. (2017) reported effects of heat exposure in utero on adult earnings in U.S. employer-employee matched longitudinal data from the Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) program.

from New York City high schools (Regents Exams) from 1998 to 2011, Park (2022) found that a 1°F (0.56°C) higher average exam-time ambient temperature reduces performance by 0.9% of a standard deviation. Using panel data of individual-level cognitive test scores administered at respondents' homes for children as part of the National Longitudinal Survey of Youth (NLSY79), Graff Zivin et al. (2018) found that an additional 1.8°F (1°C) of average daily ambient temperature above 69.8°F (21°C) reduced math performance by 0.219 percentile point (no significant effects found for reading). Using student-exam level panel data of national college entrance exam scores in China, Graff Zivin et al. (2020) found that a 1.8°F (1°C) higher average exam-period (2 days) ambient temperature reduced performance by 0.34%. Using panel data of individual-level cognitive test scores administered at respondents' homes for adults as well as children as part of a nationally representative biennial longitudinal survey in China, Zhang et al. (2024) found that a test day with an average ambient temperature above 89.6°F (32°C), relative to a day in the 71.6°F–75.2°F (22°C–24°C) range, leads to a reduction in math performance by 6.6% of a standard deviation (no significant effects found for reading).

II. Athletic Performance.

Several studies found negative effects of heat exposure on athletic performance, despite this discussion being grouped with studies on mental performance, athletic performance is likely related to both mental and physical performance (Burke et al., 2023, p. 11).

Using athlete-contest level panel data of 3,196 professional archers in China from 2010 to 2016, Qiu and Zhao (2022) found a negative effect of higher daily heat index on performance. Relative to the baseline heat index range of 64.4°F–71.6°F (18°C–22°C)[132], the study found that at sample average wind speed of 2.35 meters per second, average score decreased by approximately 3% when the heat index was 78.8°F–93.2°F (26°C–34°C) and by 10.4% when the heat index exceeded 93.2°F (34°C). They also found that the effect of higher heat index on performance was less negative for top performers (defined as athletes whose performance index, defined as their average scores in all contests in previous competitions, exceeds the 90th percentile).

Using athlete-competition level panel data on 3.5 million collegiate track and field performances from 2005 to 2019, Sexton et al. (2022) found a nonlinear relationship between daily average ambient temperature and performance. Performance of sprint and strength events improved with increasing temperatures up to 75°F (23.9°C), after which decline in performance was insignificant; on the other hand, performances in endurance events declined significantly when temperatures were above 60°F (15.6°C), by 5 percentage points for each 5°F (2.78°C) increase in daily average ambient temperature relative to the baseline temperature range of 55°F–60°F (12.8°C–15.6°C).

Using player-match level panel data on 177,000 tennis matches from 2002 to 2017, Burke et al. (2023) found negative effects of heat exposure on the performance of professional tennis players (e.g., more double faults, more match retirement, shorter

[132] To compute heat indices below 80°F (26.7°C), Qiu and Zhao (2022) used the following formula: HI = 0.5*(T+61.0+[(T-68.0)*1.2]+RH*0.094), where HI is heat index in Fahrenheit, T is ambient temperature in Fahrenheit, and RH is relative humidity in percentage (p. 1159, footnote 18).

rallies, less total distance run). They reported a "roughly 0.5% decline" in player performance per 1.8°F (1°C) increase in average ambient temperature of the day of the match. They also found that the effects of heat exposure on performance were less negative for players ranked in the top 10. They also noted that their estimated effect of heat exposure on professional tennis players, which the authors considered as "high-wage settings," is about "half of the roughly 1.0%" decline in labor productivity per 1.8°F (1°C) increase in ambient temperature that they estimated from their meta-analysis of 22 studies. The authors conducted the meta-analysis as part of their literature review of existing evidence of labor productivity effects of heat exposure, which focused on "lower-wage settings."

III. Workplace Performance.

Focusing on studies based on actual office work or laboratory experiments that resemble office work, Seppänen et al. (2006) conducted a meta-analysis of 24 published studies, concluding that performance decreased with a temperature above 73.4°F to 75.2°F (23°C to 24°C). The tasks analyzed include text processing, simple calculations (addition, multiplication), length of telephone customer service time, and total handling time per customer for call center workers, making them comparable to cognitive tasks conducted in other studies. They estimated a non-linear relationship between performance and heat: performance decreased by 9% at 86°F (30°C) compared to an optimal level of 69.8°F to 71.6°F (21°C to 22°C).

Some studies found evidence that heat exposure affects the mental performance of outdoor workers. Bendak et al. (2022) conducted a longitudinal empirical study to assess how high ambient temperatures affect construction workers' performance on a variety of tasks measuring reaction time, finding that task performance was lower in high ambient temperatures.

However, their analysis compared summer and winter months; therefore, the results are possibly confounded by seasonality effects. Similarly, Mazlomi et al. (2017) reported that workplace heat conditions measured by WBGT were negatively correlated with foundry plant workers' performance in cognitive tests. In contrast, Spector et al. (2018) found no association between maximum work-shift WBGT and post-shift reaction time or postural sway for 46 tree fruit harvesters in Washington state.

D. Economic Output.

Studies that documented the economic output effects of heat exposure fall into two groups. The first group of studies directly estimated the effect on heat exposure using plant/firm-level and region-level output data. The second group of studies borrowed heat exposure-work capacity response functions from the occupational health literature (which are derived from empirical data or existing ACGIH/NIOSH/ISO work-rest guidelines) and assumed workers are behaving according to these exposure-response functions.

I. Studies Directly Estimating the Effect on Heat Exposure Using Economic Output Data.

Numerous studies in the economics literature found evidence of negative output effects of heat exposure at the plant/firm-level and region-level.

This section does not focus on studies about the effects of higher temperatures on economic output through other channels such as agricultural yield, productivity of capital (e.g., faster depreciation of infrastructure), labor reallocation, energy demand, and international trade.

This section focuses on studies that used panel data to analyze changes (e.g., daily, weekly, quarterly, yearly) in temperature and outcomes of interest across space (e.g., plant/firm, region) and time. By controlling for time-invariant differences across space that may be confounded with temperature, the panel data approach helps to address some concerns over omitted variable bias associated with cross-sectional studies (Auffhammer, 2018, p. 43; Massetti and Mendelsohn, 2018, p. 327).

a. Plant/Firm-Level Output Effects.

Several studies found economic output effects of heat exposure using plant/firm-level panel data. Cachon et al. (2012) followed 64 automobile manufacturing plants in the U.S. from 1994 to 2005 and found that a week with six or more days with a daily maximum ambient temperature exceeding 90°F (32.2°C) reduced weekly production by 8%. The findings control for potential confounders such as changes in national demand and seasonality in demand for specific types of automobiles. However, the data did not allow the study to distinguish the contribution of labor productivity and labor supply. Information on the extent of indoor climate controls in these manufacturing plants was also not available.

Somanathan et al. (2021) estimated the output effects of heat exposure at different levels of aggregation (worker, plant, district) and found that their estimated effects are all of similar magnitude. Using daily worker-level production data from selected manufacturing firms in India, they found that daily output per worker declined in higher outdoor temperatures, falling 2.7% per 1.8°F (1°C) increase in daily maximum ambient temperature above 77°F (25°C) (this study was also mentioned above in Section VIII.I.II.B.I.). Using annual plant-level output data from a nationally representative panel of manufacturing plants in India, they found that annual plant-level output (measured by value added, defined as the difference between total output and the value of intermediate inputs) decreased by 2.1% per 1.8°F (1°C) increase in the annual average of the daily maximum ambient temperature. Under the specification of the Cobb-Douglas function, they reported that changes in labor input as opposed to capital input explains these declines in plant-level output.[133] Using annual district-level manufacturing sector GDP data from a sample of 438 districts in India, they found that annual district-level manufacturing output decreased by 3.5% per 1.8°F (1°C) increase in the annual average of the daily maximum ambient temperature. The authors further noted that the magnitude of their estimated effects mirrored the country-level estimates of output effects in the literature (country-level studies are described in more detail in Section VIII.I.II.D.I.b., below), which they interpreted as evidence heat exposure affects output through labor productivity.

Using daily production line-level data from garment factories around Bangalore, India, Adhvaryu et al. (2020) found that production line efficiency (measured as ratio of realized output to target output) decreased in higher outdoor temperatures, by 2.1% for

[133] Assuming the specification of the Cobb-Douglas production function, Somanathan et al. (2021) also found that changes in labor input (measured by number of full-time workers) as opposed to capital input (measured by net value of equipment of machinery at the start of each year) explained the negative effect of higher temperature on plant-level output.

per 1.8°F (1°C) increase in daily average WBGT above 66.2°F (19°C). They did not find significant effects of higher temperatures on worker attendance, providing further support that labor productivity effects were likely the reason behind the observed relationship. Using annual firm-level data from the annual survey of industrial firms that are "above-scale" (with sales over a certain threshold) in China from 1998 to 2007 and assuming the specification of the Cobb-Douglas function, Zhang et al. (2018) found an inverted U-shaped relationship between temperature and total factor productivity (TFP) and output in the Chinese manufacturing sector. They found that, relative to a year with an extra day of average ambient temperature of 50°F–60°F (10°C–15.6°C), a year with an extra day over 90°F (32.2°C) had lower annual firm-level TFP by 0.56% and lower firm-level output (measured by value added, defined as the difference between total output and the value of intermediate inputs) by 0.45%. They also found that the TFP effects and output effects of temperature are of similar magnitude for both labor-intensive and capital-intensive firms, suggesting that both labor productivity and capital productivity were affected by heat exposure.

Using the same dataset as Zhang et al. (2018), Chen and Yang (2019) found that a 1.8°F (1°C) increase in the average summer temperature (3-month average of daily average ambient temperatures for months June through August) decreased value added per worker by 3.4% to 4.5%. They also found two potential channels through which higher temperatures reduce output: decrease in firm investment and increase in inventory levels.

Using annual firm-level data on revenue per worker in the manufacturing and services sectors from 15 developed and developing countries, Nath (2020) found a stronger negative effect of an extra hot day (a day with maximum ambient temperature of 104°F (40°C) relative to a day of 86°F (30°C)) on annual revenue per worker for poorer countries (i.e., lower purchasing power parity (PPP)-adjusted GDP per capita). They also found that the decline in revenue per worker was driven by changes in both the numerator (annual revenue) and denominator (annual employment), where the change in the numerator was greater than that of the denominator.

There are several caveats with studies reporting plant/firm-level output effects of heat exposure. First, although some studies identified labor productivity as the main mechanism for their findings (Somanathan et al., 2021; Adhvaryu et al., 2020; Nath, 2020), the literature overall is inconclusive regarding the extent to which the effects are driven by labor productivity (versus other channels such as labor supply and capital).

Second, some studies used outdoor heat conditions as a proxy for indoor heat conditions to estimate the labor productivity effects of heat exposure in indoor work settings. However, indoor heat conditions may not be perfectly correlated with outdoor heat conditions, especially with the presence of heat-generating lighting and machines and the unknown extent of indoor climate controls (Cachon et al., 2012; Adhvaryu et al.,2020[134]).

b. Region-Level Output Effects.

[134] Using indoor temperature data that was not available during the period when labor productivity effects were analyzed and was available only afterwards, Adhvaryu et al. (2020) reported a high but imperfect pass-through of 79% of outdoor ambient temperature to indoor ambient temperature.

Several studies found economic output effects of heat exposure using region-level panel data. Some studies used county-level or state-level panel data to estimate the effects of heat on economic output. Deryugina and Hsiang (2014) used U.S. county-level panel data of annual total personal income per capita and daily weather from 1969 to 2011 to find that average per-day personal income per capita declines 1.68% per 1.8°F (1°C) increase in daily average ambient temperature above 59°F (15°C). Behrer and Park (2017) used U.S. county-level panel data of annual non-agricultural payroll per capita and daily weather from 1986 to 2011 to find that an additional hot day (a day of daily maximum ambient temperature above 95°F (35°C) relative to a day of 70°F–79°F (21.1°C–26.1°C)) reduced annual payroll per capita by 0.04%. Colacito et al. (2019) used U.S. state-level panel data of state GDP (i.e., gross state product) and daily weather to find that annual growth rate of a state's output declined by 0.15–0.25 percentage point per 1°F (0.56°C) increase in the average summer ambient temperature (three-month average of daily average ambient temperatures for months July through September).

Some studies used country-level panel data to estimate the effects of heat on economic output. Hsiang (2010) found for a panel of 28 Caribbean-Basin countries from 1970 to 2006 that annual output decreased by 2.4% per 1.8°F (1°C) increase in the average annual ambient temperature and the effects were driven by temperature changes during the hottest season (September through November). Furthermore, the study highlighted the similarity between their estimated output effects of temperature and the worker productivity effects of temperature reported in the "ergonomics and physiology" literature as evidence for labor productivity being an important channel underlying the economic effects of heat exposure. Dell et al. (2012) found for a panel of 124 countries from 1950 to 2003 that higher temperatures affected growth rates as well as level of output, but only in poor countries, defined as "having below-median PPP-adjusted per capita GDP in the first year the country enters the dataset." They found that 1.8°F (1°C) higher annual average ambient temperature in poor countries was associated with 2.04%p lower annual average growth in industrial output (growth in value added in mining, manufacturing, construction, electricity, water, and gas sectors). Some studies also found a nonlinear effect of temperature on economic output, implying that higher temperature negatively affects poor countries that tend to be hot and positively affects rich countries that tend to be cold (Heal and Park, 2016, p. 356). Heal and Park (2013) found for a panel of 134 countries from 1950 to 2006 that the response of annual real GDP per capita to annual average ambient temperature is nonlinear, that is, an inverted U-shaped response peaking at around 59°F–68°F (15°C–20°C). Burke et al. (2015) found for a panel of 166 countries from 1960 to 2010 an inverted U-shaped response of annual average GDP per capita to annual average temperate peaking at 55.4°F (13°C).

There are several caveats with studies reporting region-level output effects of heat exposure.

First, there is uncertainty regarding the extent to which labor productivity alone can explain the decline in output due to heat exposure (Lai et al., 2023). On the one hand, several studies highlighted labor productivity as an important if not the main channel through which heat exposure negatively affects output (e.g., Hsiang, 2010; Somanathan et al., 2021; Dell et al., 2014). On the other hand, due to the less frequent measurements of output (e.g., weekly, monthly, yearly), it is unclear if the results were driven by reductions in labor supply, labor productivity, labor demand, capital productivity, firm investment, increase in firm costs, or "some combination of all of these" (Behrer et al., 2021). For example, the estimated changes in output could be capturing demand-side factors either positively or negatively correlated with temperature (e.g., demand for ice cream increases with temperature; demand for outdoor recreation decreases with temperature) (Behrer and Park, 2017, p. 16). Changes in payroll may also not necessarily capture only changes in labor productivity but also capture changes in labor supply and increased firm costs (e.g., increased costs due to higher utilization of air-conditioning reducing firm profits or net income) (Behrer and Park, 2017, p. 13).

Second, although some of these studies found effects of heat-exposure on nonagricultural output, these observed associations may be in part due to the non-agricultural sectors facing less demand as a spillover effect of agricultural yield reductions from the agricultural sector (Dell et al., 2012, p. 85; Heal and Park, 2016, p. 9).

II. Studies Borrowing Exposure-Response Functions from Occupational Health Literature.

Section VIII.I.II.D.II. discussed studies that directly estimated the relationship between heat exposure and economic output and tried to uncover the underlying the potential mechanisms such as labor productivity.

This section discusses other studies that borrowed heat exposure-work capacity response (exposure-response) functions that were derived by existing studies in the occupational health literature. Applying these functions to the worker population of interest (e.g., outdoor workers nationwide), these studies derived economy-wide labor productivity loss and the associated economic cost in terms of lost wages or lost output.

As discussed in the Section VIII.I.II.B.I.a., exposure-response functions in the occupational health literature fall into two groups. The first group of exposure-response functions are based on empirical data (e.g., Hothaps function derived in Kjellstrom et al., 2014; PWC function derived in Foster et al., 2021). The second group of exposure-response functions are based on recommended work-rest ratios in existing work-rest guidelines by NIOSH, ACGIH, and ISO (e.g., Kjellstrom et al., 2009b; Dunne et al., 2013).

These empirically-derived or guideline-based exposure-response functions from the occupational health literature were applied by several studies to macroeconomic data and models to estimate the economic impact of heat exposure. These studies fall into three groups: the first group of studies (e.g., Orlov et al., 2019; Morabito et al., 2020, Nelson et al., 2024) borrowed the empirically-derived functions; the second group of studies (e.g., DARA, 2012; Vanos et al., 2019; Takakura et al., 2017; Atlantic Council, 2022; de Lima et al., 2021) borrowed the guideline-based functions ; and the third group of studies (e.g., Kjellstrom et al., 2018; ILO, 2019; Atlantic Council, 2021; Romanello et al., 2023; Dasgupta et al., 2021) borrowed and combined empirically-derived functions with the guideline-based functions.

There are some caveats with studies relying on existing exposure-response functions to estimate the economic impact of heat exposure. First, empirically-derived exposure-response functions are context-specific (e.g., the Hothaps function is based on data from acclimatized outdoor workers in hotter regions; the PWC function is based on data from unacclimatized young adults in indoor climatic chambers). Studies relying on empirically-derived functions are effectively assuming that the average worker behaves as predicted by these context-specific functions.

Second, existing work-rest guidelines were designed to increase work-rest ratios to minimize heat-related illnesses (Borg et al., 2021, p. 12) and were never intended to estimate the casual effect of heat exposure on work capacity (Foster et al., 2021, p. 1216). Studies relying on guideline-based exposure-response functions effectively assumed that the average worker behaves according to the recommended work-rest ratios. Therefore, these studies reported larger economic costs associated with lost work capacity from heat than what is reported by empirical studies (Borg et al., 2021, p. 12).

E. Worker Utility.

Higher temperatures not only reduce labor supply and labor productivity, but also “cause discomfort” (Graff Zivin and Neidell, 2014, p. 1) or “make work more arduous” for those able to work (Rode et al., 2022, p. 3). Several studies have indeed found evidence that workers dislike working in the heat, suggesting the negative effects of heat exposure on worker utility.

Some studies found evidence of the negative effect of heat exposure on worker utility based on worker surveys. Krishnamurthy et al. (2017) reported that about a quarter of surveyed steel factory workers in India reported social impacts on their personal lives attributable to occupational heat stress. Reported impacts include the time and resources spent coping with the heat and the excessive exhaustion impeding the engagement in family and social interactions outside work. Such responses highlight a potential mechanism through which heat increases disutility of labor. LoPalo (2023) also found that in higher temperatures, household survey interviewers worked longer hours (by starting earlier in the day and spending more time on each interview) to avoid working during hotter times of the day and to also meet their daily target number of completed interviews, suggesting a loss in the welfare of the interviewer through a loss of leisure hours.

Some workers even reported intentions to change jobs due to heat exposure, as expressed in an online survey conducted by Zander et al. (2015), showing that 27% of the surveyed Australian workers exposed to heat said they would eventually change jobs because of heat at their workplace. In contrast, only 8% of the surveyed workers who are sometimes exposed to heat said they considered this option, and those rarely exposed only expressed this 2% of the time. On the other hand, Kahn (2016) highlighted an example of market failure where employers having monopsony power in local labor markets can still hire workers at low wages for “unpleasant” jobs exposed to heat without adequate worker protection measures in place, such as large warehouses without air-conditioning (p. 171).

Interpreting their empirically-estimated decline in labor supply in higher temperatures as workers choosing to work less in the heat at the cost of foregoing pay (discussed above in Section VIII.I.II.A.), Rode et al. (2022) derived the willingness-to-pay to avoid the increased disutility of working in higher temperatures (defined as the increase in the wage rate that is needed to offset the increased disutility of labor).

F. Summary of Section VIII.I.II.

The literature documents effects of heat exposure on outcomes with economic consequences. Effects are observed in a variety of occupational settings, suggesting that the effects of heat exposure are widespread across a broad range of tasks that rely on physical or cognitive skills and that heat exposure affects workers in both indoor and outdoor settings. In particular, the literature recognizes labor productivity as a potential channel through which heat exposure affects economic outcomes.

III. Workplace Characteristics and Labor Productivity Effects of Heat Exposure.

The literature's varying estimates of the effect of heat exposure on labor productivity could be attributed to differences in workplace characteristics, such as incentive structures and availability of adaptation measures (Park et al., 2021, p. 8, footnote 13). These workplace characteristics should be considered when interpreting the variation in estimates of the labor productivity-related effects of heat exposure in the literature (Heal and Park, 2016, p. 350). This section focuses on studies that reported labor productivity (discussed in Section VIII.I.II.B., above) but also includes some studies that are potentially related to labor productivity, such as studies on mental performance (discussed in Section VIII.I.II.C., above) or studies on economic output effects that are potentially linked to labor productivity (discussed in Section VIII.I.II.D.I., above).

A. Incentive Structures.

Depending on the physical and behavioral aspects of the workplace, workers and management could be incentivized to change the level of effort, affecting the estimated labor productivity effect of heat exposure. Workplace factors that affect incentives include wage structure (e.g., piece-rate, hourly rate, annual salary), management techniques, mechanization, and other factors not accounted for by laboratory studies (Somanathan et al., 2021).

One of the most analyzed workplace factors in the literature is piece-rate pay. Quiller et al. (2017) found null effects of heat on labor productivity (measure by weight of fruit bins collected per hour) for a sample of piece-rate paid tree fruit harvesters in Washington state, after adjusting for confounders such as price paid per bin and shift duration. Mitchell et al. (2018) used accelerometer data from farm workers in California to find, even after adjusting for confounders, negative effects of heat on labor productivity (measured by physical activity intensity, i.e., step counts per minute, converted into metabolic equivalents) and that the effects were less negative for male workers paid by piece-rate. Such small or zero labor productivity effects could reflect compensatory effort on part of workers incentivized to be as productive as possible, the health and safety consequences of which should not be overlooked (Park et al., 2021, p. 8, footnote 13). Piece-rate workers being incentivized to work fast and take few rest breaks even under heat exposure have been evidenced in focus group discussions with U.S. farmworkers (Wadsworth et al., 2019; Lam et al., 2013).

Several studies also found that, due to physiological constraints, piece-rate workers cannot increase their effort infinitely in the heat. Stevens (2017) found that higher piece-rates induced increases in labor productivity of blueberry pickers in California at ambient temperatures below 60°F but not at higher temperatures. Masuda et al. (2021) also found in a field experiment in Indonesia that increasing the piece-rate did not increase effort, as measured by the proportion of time spent in moderate and vigorous activity through an accelerometer. This evidence is consistent with workers facing binding physiological constraints that prevent them from exerting additional effort in response to higher piece-rates at high temperatures.

In their findings of the labor productivity effects of environmental conditions, some studies also addressed the possibility that piece-rate workers' labor productivity could decline further if they are subject to state minimum wage laws (e.g., Stevens, 2017 in the context of heat; Graff Zivin and Neidell, 2012 in the context of ozone pollution). Hypothetically, compared to when not guaranteed a minimum wage, higher temperatures could lead piece-rate workers to exert less effort and therefore result in greater decline in labor productivity.

From data on Demographic and Health Surveys (DHS) interviewers from 46 developing countries, LoPalo (2023) found nuanced adjustments in effort by DHS interviewers. DHS interviewers are paid a fixed daily wage (i.e., not piece-rate) but are still monitored by supervisors to ensure they meet the target number of completed interviews. Under this contractual structure, higher temperatures result in lower labor productivity in terms of number of completed interviews per hour—interviewers are able to maintain the same daily number of completed interviews but at the cost of a longer shift from trying to avoid working in the heat (by starting work earlier and spending more time on each interview). They also found that data quality problems (e.g., missing responses) become more frequent on hotter days, suggesting that workers shift effort away from production quality, which is less noticeable to supervisors, to production quantity, which is more noticeable.

B. Adaptation.

Regarding adaptation measures[135] alleviating the negative labor productivity-related effects of heat exposure, the most analyzed in the literature are the adoption of engineering controls. Using microdata from selected manufacturing plants in India, Somanathan et al. (2021) found that climate controls in the workplace eliminated declines in labor productivity due to elevated temperatures but did not eliminate declines in labor supply (based on worker attendance records). The authors conjectured declines in labor supply persisted despite climate-controlled conditions at work because workers

[135] Some studies reporting economic output effects (discussed above in Section VIII.I.II.D.I.) found heterogeneous effects of temperature depending on regional climate. They found that hotter regions displayed smaller declines in output to higher temperatures, suggesting that their findings could reflect adaptation in these regions. For example, Chen and Yang (2019) found lower sensitivity in the response of value added per worker to higher temperatures among plants associated with a single firm in warmer locations in China and raised the possibility of adaptation measures such as avoiding work during hottest times of the day playing a role. Zhang et al. (2023) used Chinese province-level panel data of construction labor productivity (defined as the ratio of the total value of output to the number of laborers in construction enterprises) and quarterly weather to find an inverted U-shaped relationship between quarterly construction labor productivity and quarterly average ambient temperature that peaked at higher temperatures in hotter regions (79.25°F (26.25°C) in eastern regions versus 68°F (20°C) for central and western regions). They conjectured that workers in hotter regions are more adapted to high temperatures so that the peak temperature after which their labor productivity started to decline was higher. Behrer and Park (2017) used U.S. county-level panel data of annual non-agricultural payroll per capita and daily weather to find that the negative effect of an additional hot day on annual payroll per capita was smaller in hotter counties (in the top quartile of the U.S. average ambient temperature distribution). They suggested that such attenuated effects of heat exposure in hotter regions can be explained by the larger presence of air-conditioning in these regions, as evidenced by region-level data on percentage of households and commercial buildings with air-conditioning. Heal and Park (2013) also found in country-level panel data that annual real GDP per capita was less negatively affected by heat exposure in hot countries where air-conditioning was more prevalent.

presumably continued to be exposed to high temperature at home and outside. Adhvaryu et al. (2020) found in line-level production data from Indian garment factories that the introduction of LED lighting (that replaced compact fluorescent lighting which generates more heat) helped to alleviate the negative effect of high outdoor temperatures on production line efficiency. Using panel data of individual-level cognitive test scores administered at respondents' homes for adults as well as children as part of a nationally representative biennial longitudinal survey in China, Zhang et al. (2024) found that their estimated effect of higher temperatures on math test scores was less negative by 36.6% for households with air-conditioning.

Some studies that found negative effects of heat exposure on athletic performance also evaluated the effects of acclimatization.[136] Using athlete-competition level panel data on collegiate track and field performances, Sexton et al. (2022) found that hotter average ambient temperatures at the home institution in the week prior to the competition ("precompetition temperatures") mitigated performance loss from high competition temperatures. They reported that for hot competitions with daily average ambient temperatures exceeding 70°F (21.1°C), performance loss from high competition temperature decreases by 1.6%–3.5% per 1.8°F (1°C) increase in temperature difference between the precompetition and competition temperatures. On the other hand, using

[136] In the context of labor supply, Graff Zivin and Neidell (2014) found that their estimated negative effect of heat exposure on labor supply was smaller in August compared to June, suggesting that workers became less sensitive to heat exposure as higher temperatures became more common. As another test for effects of acclimatization, they also found that the negative effect of heat exposure on labor supply was smaller in "warm counties" compared to "cool counties" (defined as counties in the highest and lowest third of historical July–August temperatures, respectively), although the estimated difference was not statistically significant.

athlete-contest level panel data of Chinese professional archers, Qiu and Zhao (2022) did not find evidence that heat exposure within several months prior to a competition improved competition performance in the heat. Qiu and Zhao (2022) however found evidence of benefits of "longer-term acclimatization"; athletes that trained in the southern provinces of China, where hot days are more common, were less affected by heat exposure than those trained in the northern provinces. From player-match level panel data of professional tennis players, Burke et al. (2023) also did not find evidence of benefits of acclimatization; players who played their previous match in higher temperatures did worse in their current match. Burke et al. (2023) also did not find evidence of benefits of "long-term exposure to heat"; players born or residing in locations of higher temperatures did not appear to be less affected by higher temperatures during the match. Burke et al. (2023) conjectured that their lack of evidence of benefits of acclimatization compared to Sexton et al. (2022) could be because their proxy of acclimatization captured players playing an actual match in high temperatures, while acclimatization could be "more effective during repeated episodes of more restrained effort, as emphasized in most sports heat acclimatization protocols (p. 12)."

C. Summary of Section VIII.I.III.

To summarize, workplace incentives and availability of adaptation measures affect the estimated labor productivity-related effects of heat exposure documented in the literature.

IV. Conclusion.

The available literature on the effects of heat exposure on non-health outcomes suggests that heat exposure can lead to decreased labor productivity as well as to reduced labor supply, mental performance, economic output, and worker utility. It also indicates that existing workplace characteristics such as incentive structures and adoption of adaptation measures should be considered when evaluating these negative non-health consequences of heat exposure.

J. Appendix C. Heat Exposure Methodology Used in Distributional Analysis.

The following steps were taken to quantify the fraction of workers benefiting from the proposed standard in different demographic and economic categories.

I. ACS Data Processing.

The analysis uses data from the Census Bureau's American Community Survey (ACS) from 2018 to 2022 (Ruggles et al., 2024). 2022 is the most recent available year of ACS data. ACS data provide worker-level information on demographic and economic characteristics. . The following demographic and economic characteristics are recorded in the ACS: age; race and ethnicity; sex; total family income; industry; occupation; the presence of a disability related to cognition, physical activity, mobility, self-care, vision, or hearing; and U.S. citizenship. In addition, LGBTQ+ status was inferred from cases where an individual was living (married or unmarried) with a same-sex partner.

Only data for employed workers 16 years or older was used. The ACS variables were processed as follows. Age was grouped into 10-year bins (with age 65+ as the top bin). Race and ethnicity variables were coded into the groups Hispanic, Black, Asian (including Pacific Islander), White (non-Hispanic), and other groups. Total family income was converted into deciles. Presence of a disability was coded into a single indicator variable for the presence of any disability. Sex and the presence of a same-sex partner required no further processing.

II. Merging ACS Data with Heat Exposure Measures.

Calculations of workers likely to be affected by the proposed standard from Section VIII.B., Profile of Affected Industries were next merged with the ACS data. Fractions of workers exposed to heat by industry and occupation was used. In Section VIII.B., Profile of Affected Industries, exposure was calculated at the 4-digit NAICS level and with detailed (6-digit) SOC codes. To consistently merge with the ACS, these affected workers were aggregated to the 2-digit NAICS code by 4-digit SOC code level.[137] The aggregation was done by calculating weighted average fraction of workers exposed to heat in outdoor settings and indoor settings (separately due to process heat or inadequate climate control) in each industry-occupation pair. The weights were number of workers in each 4-digit by 6-digit category, as calculated in Section VIII.B., Profile of Affected Industries. The worker-level ACS data were then merged with the industry-by-occupation exposure fractions.

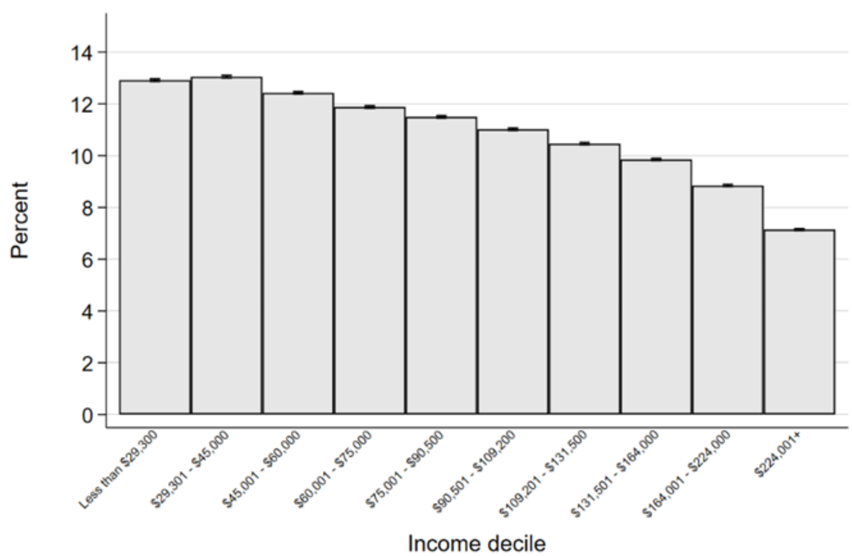
III. Calculate Exposure by Demographic and Economic Group.

[137] ACS includes 4-digit NAICS codes and detailed (6-digit) SOC codes for some industries and occupations. However, given that ACS uses different industry and occupation definitions than NAICS and SOC, many industries and occupations are only consistently coded at the 2- or 4-digit level respectively. For example, in the ACS, all construction workers are only classified at the 2-digit NAICS level (NAICS 23). Aggregation to the 2-digit NAICS code and 4-digit SOC code level ensures consistency across workers.

For each dimension of heterogeneity described above, the average share of exposed workers was calculated. The average exposure was weighted by the person-weights in the ACS to generate representative values for the U.S.

The result is a figure like figure VIII.J.1. shown below. The figure shows the percent of workers exposed to outdoor heat across total family income deciles. The deciles are given on the x-axis along with the range of income they represent, and the y-axis is the percentage of workers. The figure VIII.J.1. shows that about 13 percent of workers in low-income deciles are exposed to outdoor heat on the job while about 7 percent of workers in the highest income decile are exposed.

Figure VIII.J.1. Example of Workers with Heat Exposure in Outdoor Work Settings by Total Family Income Decile



K. Appendix D. Definitions of Core Industry Categories Used in Cost Analysis.

Table VIII.K.1. In-Scope Core Industries by Core Industry Categories.

Core Industry Category	4-Digit NAICS	NAICS Title
Agriculture, Forestry, and Fishing	111100	Oilseed and Grain Farming
Agriculture, Forestry, and Fishing	111200	Vegetable and Melon Farming
Agriculture, Forestry, and Fishing	111300	Fruit and Tree Nut Farming
Agriculture, Forestry, and Fishing	111400	Greenhouse, Nursery, and Floriculture Production
Agriculture, Forestry, and Fishing	111900	Other Crop Farming
Agriculture, Forestry, and Fishing	112100	Cattle Ranching and Farming
Agriculture, Forestry, and Fishing	112200	Hog and Pig Farming
Agriculture, Forestry, and Fishing	112300	Poultry and Egg Production
Agriculture, Forestry, and Fishing	112400	Sheep and Goat Farming
Agriculture, Forestry, and Fishing	112500	Aquaculture
Agriculture, Forestry, and Fishing	112900	Other Animal Production
Agriculture, Forestry, and Fishing	113100	Timber Tract Operations
Agriculture, Forestry, and Fishing	113200	Forest Nurseries and Gathering of Forest Products
Agriculture, Forestry, and Fishing	113300	Logging
Agriculture, Forestry, and Fishing	114100	Fishing
Agriculture, Forestry, and Fishing	114200	Hunting and Trapping
Agriculture, Forestry, and Fishing	115100	Support Activities for Crop Production
Agriculture, Forestry, and Fishing	115200	Support Activities for Animal Production
Agriculture, Forestry, and Fishing	115300	Support Activities for Forestry
Building Materials and Equipment Suppliers	423300	Lumber and Other Construction Materials Merchant Wholesalers

Core Industry Category	**4-Digit NAICS**	**NAICS Title**
Building Materials and Equipment Suppliers	423700	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers
Building Materials and Equipment Suppliers	423900	Miscellaneous Durable Goods Merchant Wholesalers
Building Materials and Equipment Suppliers	444100	Building Material and Supplies Dealers
Building Materials and Equipment Suppliers	532400	Commercial and Industrial Machinery and Equipment Rental and Leasing
Commercial Kitchens	311800	Bakeries and Tortilla Manufacturing
Commercial Kitchens	722300	Special Food Services
Commercial Kitchens	722400	Drinking Places (Alcoholic Beverages)
Commercial Kitchens	722500	Restaurants and Other Eating Places
Construction	236100	Residential Building Construction
Construction	236200	Nonresidential Building Construction
Construction	237100	Utility System Construction
Construction	237200	Land Subdivision
Construction	237300	Highway, Street, and Bridge Construction
Construction	237900	Other Heavy and Civil Engineering Construction
Construction	238100	Foundation, Structure, and Building Exterior Contractors
Construction	238200	Building Equipment Contractors
Construction	238300	Building Finishing Contractors
Construction	238900	Other Specialty Trade Contractors
Construction	541300	Architectural, Engineering, and Related Services
Drycleaning and Commercial Laundries	812300	Drycleaning and Laundry Services
Landscaping and Facilities Support	561200	Facilities Support Services
Landscaping and Facilities Support	561700	Services to Buildings and Dwellings

Core Industry Category	4-Digit NAICS	NAICS Title
Landscaping and Facilities Support	561900	Other Support Services
Landscaping and Facilities Support	812200	Death Care Services
Landscaping and Facilities Support	812900	Other Personal Services
Maintenance and Repair	811100	Automotive Repair and Maintenance
Maintenance and Repair	811300	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance
Maintenance and Repair	811400	Personal and Household Goods Repair and Maintenance
Manufacturing	311100	Animal Food Manufacturing
Manufacturing	311200	Grain and Oilseed Milling
Manufacturing	311300	Sugar and Confectionery Product Manufacturing
Manufacturing	311400	Fruit and Vegetable Preserving and Specialty Food Manufacturing
Manufacturing	311500	Dairy Product Manufacturing
Manufacturing	311600	Animal Slaughtering and Processing
Manufacturing	311700	Seafood Product Preparation and Packaging
Manufacturing	311900	Other Food Manufacturing
Manufacturing	312100	Beverage Manufacturing
Manufacturing	312200	Tobacco Manufacturing
Manufacturing	313100	Fiber, Yarn, and Thread Mills
Manufacturing	313200	Fabric Mills
Manufacturing	313300	Textile and Fabric Finishing and Fabric Coating Mills
Manufacturing	314100	Textile Furnishings Mills
Manufacturing	314900	Other Textile Product Mills
Manufacturing	315100	Apparel Knitting Mills
Manufacturing	315200	Cut and Sew Apparel Manufacturing
Manufacturing	315900	Apparel Accessories and Other Apparel Manufacturing
Manufacturing	316100	Leather and Hide Tanning and Finishing

Core Industry Category	4-Digit NAICS	NAICS Title
Manufacturing	316200	Footwear Manufacturing
Manufacturing	316900	Other Leather and Allied Product Manufacturing
Manufacturing	321100	Sawmills and Wood Preservation
Manufacturing	321200	Veneer, Plywood, and Engineered Wood Product Manufacturing
Manufacturing	321900	Other Wood Product Manufacturing
Manufacturing	322100	Pulp, Paper, and Paperboard Mills
Manufacturing	322200	Converted Paper Product Manufacturing
Manufacturing	323100	Printing and Related Support Activities
Manufacturing	324100	Petroleum and Coal Products Manufacturing
Manufacturing	325100	Basic Chemical Manufacturing
Manufacturing	325200	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing
Manufacturing	325300	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing
Manufacturing	325400	Pharmaceutical and Medicine Manufacturing
Manufacturing	325500	Paint, Coating, and Adhesive Manufacturing
Manufacturing	325600	Soap, Cleaning Compound, and Toilet Preparation Manufacturing
Manufacturing	325900	Other Chemical Product and Preparation Manufacturing
Manufacturing	326100	Plastics Product Manufacturing
Manufacturing	326200	Rubber Product Manufacturing
Manufacturing	327100	Clay Product and Refractory Manufacturing
Manufacturing	327200	Glass and Glass Product Manufacturing
Manufacturing	327300	Cement and Concrete Product Manufacturing
Manufacturing	327400	Lime and Gypsum Product Manufacturing
Manufacturing	327900	Other Nonmetallic Mineral Product Manufacturing
Manufacturing	331100	Iron and Steel Mills and Ferroalloy Manufacturing
Manufacturing	331200	Steel Product Manufacturing from Purchased Steel
Manufacturing	331300	Alumina and Aluminum Production and Processing

Core Industry Category	4-Digit NAICS	NAICS Title
Manufacturing	331400	Nonferrous Metal (except Aluminum) Production and Processing
Manufacturing	331500	Foundries
Manufacturing	332100	Forging and Stamping
Manufacturing	332200	Cutlery and Handtool Manufacturing
Manufacturing	332300	Architectural and Structural Metals Manufacturing
Manufacturing	332400	Boiler, Tank, and Shipping Container Manufacturing
Manufacturing	332500	Hardware Manufacturing
Manufacturing	332600	Spring and Wire Product Manufacturing
Manufacturing	332700	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing
Manufacturing	332800	Coating, Engraving, Heat Treating, and Allied Activities
Manufacturing	332900	Other Fabricated Metal Product Manufacturing
Manufacturing	333100	Agriculture, Construction, and Mining Machinery Manufacturing
Manufacturing	333200	Industrial Machinery Manufacturing
Manufacturing	333300	Commercial and Service Industry Machinery Manufacturing
Manufacturing	333400	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing
Manufacturing	333500	Metalworking Machinery Manufacturing
Manufacturing	333600	Engine, Turbine, and Power Transmission Equipment Manufacturing
Manufacturing	333900	Other General Purpose Machinery Manufacturing
Manufacturing	335100	Electric Lighting Equipment Manufacturing
Manufacturing	335200	Household Appliance Manufacturing
Manufacturing	335300	Electrical Equipment Manufacturing
Manufacturing	335900	Other Electrical Equipment and Component Manufacturing
Manufacturing	336100	Motor Vehicle Manufacturing
Manufacturing	336200	Motor Vehicle Body and Trailer Manufacturing
Manufacturing	336300	Motor Vehicle Parts Manufacturing
Manufacturing	336400	Aerospace Product and Parts Manufacturing

Core Industry Category	4-Digit NAICS	NAICS Title
Manufacturing	336500	Railroad Rolling Stock Manufacturing
Manufacturing	336600	Ship and Boat Building
Manufacturing	336900	Other Transportation Equipment Manufacturing
Manufacturing	337100	Household and Institutional Furniture and Kitchen Cabinet Manufacturing
Manufacturing	337200	Office Furniture (including Fixtures) Manufacturing
Manufacturing	337900	Other Furniture Related Product Manufacturing
Manufacturing	339100	Medical Equipment and Supplies Manufacturing
Manufacturing	339900	Other Miscellaneous Manufacturing
Oil and Gas	211100	Oil and Gas Extraction
Oil and Gas	213100	Support Activities for Mining
Oil and Gas	486100	Pipeline Transportation of Crude Oil
Oil and Gas	486200	Pipeline Transportation of Natural Gas
Oil and Gas	486900	Other Pipeline Transportation
Postal and Delivery Services	491100	Postal Service
Postal and Delivery Services	492100	Couriers and Express Delivery Services
Postal and Delivery Services	492200	Local Messengers and Local Delivery
Recreation and Amusement	711200	Spectator Sports
Recreation and Amusement	713100	Amusement Parks and Arcades
Recreation and Amusement	713900	Other Amusement and Recreation Industries
Recreation and Amusement	721200	RV (Recreational Vehicle) Parks and Recreational Camps
Sanitation and Waste Removal	562100	Waste Collection
Sanitation and Waste Removal	562200	Waste Treatment and Disposal
Sanitation and Waste Removal	562900	Remediation and Other Waste Management Services
Telecommunications	517100	Wired and Wireless Telecommunications (except Satellite)
Telecommunications	517400	Satellite Telecommunications

Core Industry Category	4-Digit NAICS	NAICS Title
Telecommunications	517800	All Other Telecommunications
Temporary Help Services	561300	Employment Services
Transportation	481100	Scheduled Air Transportation
Transportation	481200	Nonscheduled Air Transportation
Transportation	482100	Rail Transportation
Transportation	483100	Deep Sea, Coastal, and Great Lakes Water Transportation
Transportation	483200	Inland Water Transportation
Transportation	484100	General Freight Trucking
Transportation	484200	Specialized Freight Trucking
Transportation	485100	Urban Transit Systems
Transportation	485900	Other Transit and Ground Passenger Transportation
Transportation	488100	Support Activities for Air Transportation
Transportation	488200	Support Activities for Rail Transportation
Transportation	488300	Support Activities for Water Transportation
Transportation	488400	Support Activities for Road Transportation
Transportation	488900	Other Support Activities for Transportation
Utilities	221100	Electric Power Generation, Transmission and Distribution
Utilities	221200	Natural Gas Distribution
Utilities	221300	Water, Sewage and Other Systems
Warehousing	493100	Warehousing and Storage

Table VIII.K.2. In-Scope Non-Core Industries Used in Cost Analysis.

4-Digit NAICS	NAICS Title
334100	Computer and Peripheral Equipment Manufacturing
334200	Communications Equipment Manufacturing
334300	Audio and Video Equipment Manufacturing
334400	Semiconductor and Other Electronic Component Manufacturing
334500	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing
334600	Manufacturing and Reproducing Magnetic and Optical Media
423100	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers
423200	Furniture and Home Furnishing Merchant Wholesalers
423400	Professional and Commercial Equipment and Supplies Merchant Wholesalers
423500	Metal and Mineral (except Petroleum) Merchant Wholesalers
423600	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers
423800	Machinery, Equipment, and Supplies Merchant Wholesalers
424100	Paper and Paper Product Merchant Wholesalers
424200	Drugs and Druggists' Sundries Merchant Wholesalers
424300	Apparel, Piece Goods, and Notions Merchant Wholesalers
424400	Grocery and Related Product Merchant Wholesalers
424500	Farm Product Raw Material Merchant Wholesalers
424600	Chemical and Allied Products Merchant Wholesalers
424700	Petroleum and Petroleum Products Merchant Wholesalers
424800	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers
424900	Miscellaneous Nondurable Goods Merchant Wholesalers
425100	Wholesale Trade Agents and Brokers
441100	Automobile Dealers
441200	Other Motor Vehicle Dealers
441300	Automotive Parts, Accessories, and Tire Retailers

4-Digit NAICS	NAICS Title
444200	Lawn and Garden Equipment and Supplies Retailers
445100	Grocery and Convenience Retailers
445200	Specialty Food Retailers
445300	Beer, Wine, and Liquor Retailers
449100	Furniture and Home Furnishings Retailers
449200	Electronics and Appliance Retailers
455100	Department Stores
455200	Warehouse Clubs, Supercenters, and Other General Merchandise Retailers
456100	Health and Personal Care Retailers
457100	Gasoline Stations
457200	Fuel Dealers
458100	Clothing and Clothing Accessories Retailers
458200	Shoe Retailers
458300	Jewelry, Luggage, and Leather Goods Retailers
459100	Sporting Goods, Hobby, and Musical Instrument Retailers
459200	Book Retailers and News Dealers
459300	Florists
459400	Office Supplies, Stationery, and Gift Retailers
459500	Used Merchandise Retailers
459900	Other Miscellaneous Retailers
485200	Interurban and Rural Bus Transportation
485300	Taxi and Limousine Service
485400	School and Employee Bus Transportation
485500	Charter Bus Industry
487100	Scenic and Sightseeing Transportation, Land

4-Digit NAICS	NAICS Title
487200	Scenic and Sightseeing Transportation, Water
487900	Scenic and Sightseeing Transportation, Other
488500	Freight Transportation Arrangement
512100	Motion Picture and Video Industries
512200	Sound Recording Industries
513100	Newspaper, Periodical, Book, and Directory Publishers
513200	Software Publishers
516100	Radio and Television Broadcasting Stations
516200	Media Streaming Distribution Services, Social Networks, and Other Media Networks and Content Providers
518200	Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services
519200	Web Search Portals, Libraries, Archives, and Other Information Services
521100	Monetary Authorities-Central Bank
522100	Depository Credit Intermediation
522200	Nondepository Credit Intermediation
522300	Activities Related to Credit Intermediation
523100	Securities and Commodity Contracts Intermediation and Brokerage
523200	Securities and Commodity Exchanges
523900	Other Financial Investment Activities
524100	Insurance Carriers
524200	Agencies, Brokerages, and Other Insurance Related Activities
525100	Insurance and Employee Benefit Funds
525900	Other Investment Pools and Funds
531100	Lessors of Real Estate
531200	Offices of Real Estate Agents and Brokers

4-Digit NAICS	NAICS Title
531300	Activities Related to Real Estate
532100	Automotive Equipment Rental and Leasing
532200	Consumer Goods Rental
532300	General Rental Centers
533100	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)
541100	Legal Services
541200	Accounting, Tax Preparation, Bookkeeping, and Payroll Services
541400	Specialized Design Services
541500	Computer Systems Design and Related Services
541600	Management, Scientific, and Technical Consulting Services
541700	Scientific Research and Development Services
541800	Advertising, Public Relations, and Related Services
541900	Other Professional, Scientific, and Technical Services
551100	Management of Companies and Enterprises
561100	Office Administrative Services
561400	Business Support Services
561500	Travel Arrangement and Reservation Services
561600	Investigation and Security Services
611100	Elementary and Secondary Schools
611200	Junior Colleges
611300	Colleges, Universities, and Professional Schools
611400	Business Schools and Computer and Management Training
611500	Technical and Trade Schools
611600	Other Schools and Instruction
611700	Educational Support Services

4-Digit NAICS	NAICS Title
621100	Offices of Physicians
621200	Offices of Dentists
621300	Offices of Other Health Practitioners
621400	Outpatient Care Centers
621500	Medical and Diagnostic Laboratories
621600	Home Health Care Services
621900	Other Ambulatory Health Care Services
622100	General Medical and Surgical Hospitals
622200	Psychiatric and Substance Abuse Hospitals
622300	Specialty (except Psychiatric and Substance Abuse) Hospitals
623100	Nursing Care Facilities (Skilled Nursing Facilities)
623200	Residential Intellectual and Developmental Disability, Mental Health, and Substance Abuse Facilities
623300	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly
623900	Other Residential Care Facilities
624100	Individual and Family Services
624200	Community Food and Housing, and Emergency and Other Relief Services
624300	Vocational Rehabilitation Services
624400	Child Care Services
711100	Performing Arts Companies
711300	Promoters of Performing Arts, Sports, and Similar Events
711400	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures
711500	Independent Artists, Writers, and Performers
712100	Museums, Historical Sites, and Similar Institutions
713200	Gambling Industries
721100	Traveler Accommodation

4-Digit NAICS	NAICS Title
721300	Rooming and Boarding Houses, Dormitories, and Workers' Camps
811200	Electronic and Precision Equipment Repair and Maintenance
812100	Personal Care Services
813100	Religious Organizations
813200	Grantmaking and Giving Services
813300	Social Advocacy Organizations
813400	Civic and Social Organizations
813900	Business, Professional, Labor, Political, and Similar Organizations
999200	State Government
999300	Local Government

IX. Technological Feasibility

A. Introduction.

The Occupational Safety and Health Administration (OSHA) is proposing a *Heat Injury and Illness Prevention* standard that will require employers, whose employees are occupationally exposed to hazardous heat, to develop and implement a Heat Injury and Illness Prevention Plan. As part of the plan, this proposed standard will require employers to implement control measures to mitigate the risk to workers from occupational exposure to heat when temperatures exceed specified triggers.

As discussed in Pertinent Legal Authority (Section II.), OSHA must prove, by substantial evidence in the rulemaking record, that its standards are technologically and economically feasible, which the Supreme Court has defined as "capable of being done, executed, or effected" (*American Textile Mfrs. Inst. v. Donovan (Cotton Dust),* 452 U.S. 490, 508-09 (1981)). A standard is technologically feasible if the protective measures it requires already exist, can be brought into existence with available technology, or can be created with technology that can reasonably be expected to be developed (*United Steelworkers v. Marshall (Lead I),* 647 F.2d 1189, 1272 (D.C. Cir, 1980), *cert. denied,* 453 U.S. 913 (1981); *Am. Iron & Steel Inst. v. Occupational Safety & Health Admin. (Lead II)*, 939 F.2d 975, 980 (D.C. Cir. 1991)). OSHA has reviewed the requirements that would be imposed by the proposed Heat Injury and Illness Prevention standard and assessed the technological feasibility of complying with its requirements. As a result of this review, OSHA has preliminarily determined that achieving compliance with the proposed standard is technologically feasible.

B. Methodology.

For this proposed standard, OSHA evaluated the provisions to identify which requirements proposed the implementation of engineering control measures or would address facility and equipment related aspects of heat illness prevention, as opposed to those that would establish programs, processes, or procedures. OSHA also reviewed the workplace control practices currently in place across the affected industries as well as the recommended practices of industry trade associations and standards-setting organizations.

For this technological feasibility analysis, OSHA grouped establishments by indoor work settings based on the similarity of worker exposure sources (i.e., equipment or processes that generate heat versus ambient heat) and outdoor work settings, including mobile or transient sites, with exposure primarily to ambient heat and heat-generating processes. These work settings, and examples of occupations found in these settings, are outlined in Table IX-1 below.

Table IX-1 Facility Types Analyzed in OSHA's Preliminary Technological Feasibility Analysis

Work Setting	Heat Source	Example Facility Types / Occupations
Indoors	Heat Generating Processes	• Commercial Laundry and Drycleaning • Commercial Kitchens • Foundries • Manufacturing (Paper Mills, Wood Processing, Chemical Processing)
	Ambient Heat	• Maintenance and Repair Service • Warehouses • Sales Related Industries
Outdoors	Ambient Heat at Fixed Locations	• Airline Ground Workers • Building Material and Equipment Suppliers • Maintenance and Repair Service • Recreation and Amusement • Sales Related Industries
	Ambient Heat at Transient and Mobile Work Sites	• Agriculture, Forestry, and Fishing • Construction • Landscaping and Facilities Support • Logging/Forestry • Oil and Gas Extraction and Support Service • Postal and Delivery Services • Sanitation and Waste Removal • Transportation (Land, Water, and Rail), including Scenic and Sightseeing • Telecommunications and Utility Workers
	Heat Generating Processes	• Asphalt Paving • Cement Kilns

C. Environmental Monitoring.

The proposed rule includes requirements for employers to monitor environmental conditions in order to determine whether certain controls to protect employees exposed to heat at or above the trigger level, expressed in terms of heat index or wet bulb globe temperature (WBGT), need to be implemented. The proposed rule also requires employers utilizing fans in indoor work areas or break areas to identify any such areas where the ambient temperature (AT) exceeds 102°F in order to evaluate whether fan use may be harmful. As part of OSHA's assessment of the technological feasibility of these proposed requirements, the agency must determine whether available methods exist for measuring heat index, WBGT, and AT. As explained below, all three metrics can be monitored via instruments currently on the market.

I. Heat Index.

Heat Index (HI) is meant to reflect the temperature that the body "feels," by combining ambient temperature and either dew point temperature, or more commonly relative humidity (RH) (Anderson et al., 2013; NWS, 2024c; Steadman, 1979). The underlying formula for heat index is complex and uses several assumptions, including human body mass and height, clothing, amount of physical activity, individual heat tolerance, sunlight and ultraviolet radiation exposure, and wind speed. In the HI formula, the coefficients have been determined through empirical studies and mathematical modeling to approximate how humidity influences the effect of temperature. Different coefficients can vary depending on the unit of temperature and the formula might differ slightly between regions or meteorological agencies.

While calculating HI involves a fairly complex equation, methods for determining the HI using the ambient temperature (AT) and RH are widely available and simple to use. The most accurate way to determine the HI at work sites is through the use of direct read monitoring devices. These types of devices are readily available on the market (ERG, 2024b). The handheld devices, commonly called heat-stress monitors or heat index monitors, measure the AT, RH, and dew point, and provide the HI. These devices provide real-time, on-site measurements and can be used both indoors and outdoors. Conversely employers could use psychrometers and thermometers to measure AT and

RH, then calculate the HI using any of the tools described below. Both psychrometers and thermometers are available in digital and analog versions. For outdoor work sites, employers could also use local forecast weather data to obtain the AT and RH. This information can then be used to estimate the HI for a particular location using available charts and calculators. However, because local forecast conditions may not reflect actual working conditions indoors, OSHA is not proposing to permit the use of forecast data to determine indoor HI.

The National Weather Service (NWS) has two charts available on their website which employers can use to determine the HI, the Heat Index Chart and the Heat Index Chart for Low Humidity Locations.[138] The Heat Index Charts can be used for environments with RH ranging from 5% to 100%. To find the HI using the chart the employer must first determine the AT and RH. The HI is located in the cell where the two values meet on the chart. The National Weather Service (NWS) also has a calculator available on their website that allows users to calculate HI by entering in the temperature and humidity or dew point.[139] However, this calculator notes that results using temperatures and RH outside of the range of the NWS heat index chart may not be accurate.

Another way employers can determine the HI is through the OSHA-NIOSH Heat Safety Tool,[140] which allows users to access HI data from a mobile phone. The Heat

[138] The NWS charts contain risk categories that may not align with the proposed rule as OSHA is not relying on the risk categories noted in the chart.
[139] *https://www.wpc.ncep.noaa.gov/html/heatindex.shtml.*
[140] *https://www.osha.gov/heat/heat-app.*

Safety Tool pulls hourly forecasts specific to the inputted outdoor location from the NWS to estimate the local heat index. This tool is available for both Android and Apple mobile devices and can be downloaded from the app stores, as well as the OSHA website. As previously mentioned, while the tool is useful for outdoor work environments, local weather data may not accurately reflect indoor working conditions or situations where heat is also generated as part of the work process.

OSHA has preliminarily concluded that conducting exposure assessments to determine the HI is technologically feasible for most operations, most of the time.[141] HI is simple, easy-to-understand, and easily accessible. For indoor workplaces employers will need to take on-site measurements to determine the HI. This can be done using either direct reading instruments currently on the market or by measuring AT and RH with psychrometers and thermometers and using charts or online calculators to calculate the HI. OSHA seeks additional information and comments on the feasibility of measuring HI in different environments, including indoor environments and where heat-generating processes occur.

II. Wet Bulb Globe Temperature (WBGT).

WBGT is a measure of heat exposure that incorporates the impact of sunlight and wind, in addition to temperature and humidity. It was derived in the 1950s to track exposure and limit heat-related illness (HRI) among the U.S. Armed Services (Budd, 2008). WBGT is calculated as the weighted average of globe temperature, wet bulb

[141] OSHA notes that Oregon currently uses HI thresholds in its state standard, which is further evidence that the measurements are feasible. OR Admin. Code 437-002-0156 (indoor and outdoor) and 437-004-1131 (agriculture).

temperature, and dry bulb temperature, and accounts for AT, RH, wind speed, and solar radiation. WBGTs are measured with specialized equipment currently available on the market.

Indeed, both NIOSH REL's and ACGIH TLV's for heat stress are based on WBGT readings. Also, OSHA currently collects WBGT readings during inspections to evaluate the potential hazard from exposure to heat in accordance with procedures for performing workplace assessments in the OSHA Technical Manual (OTM), Section III., Chapter 4.

A standard WBGT instrument has a 0.15-meter, or 6-inch, black globe to measure globe temperature and a wetted thermometer to measure the natural wet bulb temperature (Budd, 2008). Various WBGT monitors have been developed, many of which use a smaller black globe and/or a relative humidity sensor in place of a wetted thermometer. Relative humidity measurements are used to calculate wet bulb temperature based on psychometric principles. Some well-known WBGT monitors include the QUESTemp series by TSI and smaller handheld devices such as that made by Kestrel (ERG, 2024b).

Although several accurate WBGT monitoring devices are available, OSHA notes that some lower-cost devices may not be sufficient to accurately measure employees' heat exposure. Non-standard monitors can be found for a lower cost, but they may not fully align with traditional WBGT thermometer measurements. Some devices may be designed to be more conservative in their measurements than others. In a review of WBGT, Budd (2008) identified key limitations of this standard equipment to measure WBGT. Four of the main concerns were inconsistent equilibration times, insufficiently robust calibration procedures, and the use of non-standard globe thermometers and natural wet bulb thermometers. Smaller bulbs typically result in shorter equilibration times, which make readings more sensitive to short-term changes in environmental conditions than larger bulbs. However, few peer-reviewed studies have been published evaluating these potential sources of error and OSHA anticipates technology has likely improved since Budd's evaluation in 2008. Given these technical considerations—including equilibration times and the need for robust calibration procedures—the use of WBGT on-site will require training to properly operate. The extent of the training would vary depending on the type of monitor.

OSHA has preliminarily determined that instruments to accurately monitor WBGT are commercially available. OSHA seeks additional comments on the use of WBGT and to identify situations in which WBGT would or would not be practical or pose challenges for employers to measure.

III. Ambient Temperature (AT).

AT is the air temperature measured using a thermometer. The primary types of thermometers used for measuring AT are liquid-in-glass thermometers, electrical thermocouples, and resistance thermometers (thermistors). Each of these types of thermometers are commercially available in a wide variety of designs. The states with permanent outdoor occupational heat standards, California and Washington, currently use fixed value thresholds of AT, further indicating the feasibility of this metric (California Occupational Safety & Health Administration, 8 CCR 3395; Washington Division of Occupational Safety and Health, WA Admin. Code 296-62-095). Based on the widespread public availability of thermometers to measure AT, OSHA has preliminarily determined that it is technologically feasible for employers to assess AT in their workplace.

IV. Preliminary Findings on Environmental Monitoring.

Several different types of instruments and methods to determine the Heat Index and WBGT are commercially available. These include the Kestrel and QuesTemp currently used by OSHA, in addition to various mobile device applications supported by NWS and NIOSH. At outdoor work sites, employers have the option of tracking local heat index forecasts provided by the NWS or other reputable sources in lieu of measuring for Heat Index or WBGT. In addition, thermometers to measure AT are widely available. Because the technology necessary to comply with the proposed standard currently exists and is commercially available, OSHA preliminarily concludes that the proposed standard's monitoring requirements are technologically feasible.

D. Engineering Controls.

Engineering controls are measures that reduce, isolate, or remove a hazard from the workplace. These engineering controls can be used to reduce exposure to heat without relying on changes in employee behavior. Therefore, engineering controls are often the most effective type of control to address workplace hazards and can also be a cost-effective layer of protection. The following are some examples of engineering controls that may reduce heat stress:

- Use air-conditioning,
- Increase general ventilation,

- Provide cooling fans,[142]
- Run local exhaust ventilation where heat is produced (e.g., laundry vents),
- Use reflective shields to block radiant heat,
- Insulate hot surfaces (e.g., furnace walls),
- Stop leaking steam,
- Provide shade for outdoor work sites.

Under the proposed standard, when exposures to heat exceed specified triggers, employers must implement feasible controls to reduce employee's exposures to heat. The requirements for the use of engineering controls differ based on the location of work, whether indoors or outdoors. For indoor work sites, employers are required to provide a break area and ensure that work areas exceeding the trigger are equipped with air-conditioning, fans and ventilation, or in the case of radiant heat, other controls to reduce heat exposure. For outdoor work sites, employers are required to provide a break area with either shade or air-conditioning.

I. Workers Exposed to Heat Generating Process.

As shown in Table IX-1—Facility Types Analyzed in OSHA's Preliminary Technological Feasibility Analysis, employees in both indoor and outdoor work operations can be exposed to heat from work processes. Radiant heat can be generated by equipment and processes such as, but not limited to, cement kilns, asphalt paving equipment, commercial laundry machines, ovens in kitchen and bakery operations,

[142] It should be noted that under certain conditions the use of fans may contribute to heat strain (Morris, 2021). See further discussion in the *Explanation of Proposed Requirements* for paragraph (e)(6), Evaluation of fan use.

foundries and other furnaces, and steam pipes. Under the proposed rule, OSHA is requiring employers to cool each indoor work area using either controls that increase evaporative heat loss from the worker (such as air-conditioning or fans) or through controls that remove the worker's exposure to radiant heat in the workspace. Because OSHA anticipates that the use of fans, dehumidifiers, and air-conditioning to control exposures from heat generating processes will be implemented in a similar manner to those controlling for ambient temperature exposures, the discussion on feasibility of those controls is contained in Section IX.D.II.A, Indoor Workspaces. OSHA requests comments on the appropriateness of this determination and seeks information on situations where the use of fans and air-conditioning would differ.

The engineering approaches to controlling radiant heat gain to the worker can be divided into two categories, those that reduce the amount of radiant heat in the workspace or those that shield the worker from the radiant heat source itself. Researchers suggest the following actions for reducing radiant heat exposures: interpose line-of-sight barriers; insulation, reflective shield and/or metallic reflecting screen, heat reflective clothing; mechanical ventilation (fans, blowers, chillers, etc.), air-conditioning where possible, and locating hot process away from work areas (NIOSH, 2016; Chesson, 2012).

Reducing radiant heat in the workspaces typically requires at least one of the following actions: lowering the process temperature, which may not be compatible with the temperature requirement of the manufacturing processes; relocating or isolating the heat source; insulating or cooling the heat source; or changing the emissivity of the hot surface by coating the material. Engineering controls for shielding the work from the radiant heat requires placing line-of-sight radiant reflective barriers or shielding between the heat source and the worker.

Of these control methods, radiant reflective shielding is generally the easiest to install. NIOSH notes that radiant reflective shielding can reduce the radiant heat load by as much as 80% to 85% (NIOSH, 2016). Employers who choose to install shielding will need to consider work process flows so that placement does not interfere with the work. Remotely operated tongs, metal chain screens, or air or hydraulically activated doors that are opened only as needed are some of the possibilities.

Isolating the source could involve construction of walls or other containment around hot equipment or process such as erecting barriers around a kiln that control heat transfer to nearby work areas (NIOSH, 2016). Morris et al. noted that "investigations into reducing the solar (radiative) heat load on workers is promising, revealing that work capacity can be more than doubled with the removal of an external radiative load," and further explained that radiation screens can be used within manufacturing shops to shield workers from heat originating from hot machinery (Morris et al., 2020). Another example of isolating the source would be installing insulation around pipes and similar equipment in the workplace that emits heat. Similarly, because leaks from steam valves and steam lines in manufacturing processes can contribute to heat stress by increasing water vapor in the air, eliminating these sources of water vapor can help reduce the overall vapor pressure in the air and thereby increase evaporative heat loss by facilitating the rate of evaporation of sweat from the skin (NIOSH, 2016). OSHA requests comments and data on other methods employers have utilized to isolate radiant heat from heat-generating processes.

Examples of waste heat recovery technology include recovery of heat from steam through condensation that would otherwise be released into the workspace. Heat recovery systems improve energy efficiency by utilizing heat transfer from hot liquids or gases and recover heat that would otherwise go to waste. Some commercial building ventilation systems use heat exchangers to transfer heat from exhaust air to the fresh intake air (NIOSH, 2016).

With regards to modifying the process or operation, OSHA notes that lowering the process temperature may not be compatible with process requirements. However, there might be ways of using materials with lower melting points or chemicals with faster curing times thereby reducing overall radiant heat production. This might also include modifying the process and work practices by limiting the time required to complete certain tasks or automating certain tasks, such as collecting samples.

Table IX-2 Heat Generating Process Controls

Controls	Examples
Local exhaust ventilation (LEV) at heat-generating sources	• LEV designed and installed at points of high heat or moisture production (such as exhaust hoods in laundry rooms or steam presses, commercial kitchen exhaust hoods). • Similar to LEV used to capture air contaminants. Dampeners and hood vary depending on moisture level of air.

Installation of waste heat recovery technology	• Used with LEV to convert heat to energy that is fed back into the system.
	  o Regenerative and recuperative burners: Capture and use the waste heat from the hot flue gas from the combustion process.
	  o Tube heat exchangers: Recover low to medium waste heat are mainly used for heating liquids.

Isolating the source of radiant heat	• Process enclosures around heat producing components. • Containment of heat producing equipment in rooms without workers.
Shielding or barriers that are radiant-reflecting or heat-absorbing	• Shielding to stop radiant heat from reaching workstations. ○ Reflective Shield: Stainless steel, aluminum or other bright metal surfaces reflect heat back towards the source. ○ Absorbent shields: Water-cooled jackets made of black-surfaced aluminum absorb and carry away heat.
Thermal insulation on hot surfaces (e.g., steam pipes)	• Reducing the radiant heat emission from hot surfaces. ○ Covering hot surfaces with sheets of low emissivity material or paint that reduces the amount of heat radiated from this hot surface into the workplace. • Insulating Hot Surfaces. ○ Insulation reduces the heat exchange between the source of heat and the work environment.
Increasing the distance between workers and the heat source	• Moving the workstation further away from the heat source. • Repositioning controls a cooler location.

A. Preliminary Feasibility Finding for Heat Generating Processes.

The proposed rule does not specify which of the engineering controls must be used for indoor workplaces. It only requires that employers implement other measures that reduce employee exposure to radiant heat in the work area as an alternative option to the use of fans or air-conditioning. OSHA has preliminarily determined that there are a number of technologically feasible engineering controls available to employers. Employers are free to choose any combination that effectively reduces exposures. Based on the discussion above, OSHA has preliminarily determined that there are no technological hurdles to compliance with this requirement for indoor workplaces.

OSHA acknowledges the limited information available on working outdoors near heat generating processes. OSHA seeks information and data on whether and under what circumstances the control options used to reduce exposure to radiant heat in indoor work areas might also be feasible for outdoor work settings.

II. Workers exposed to Ambient Heat.

A. Indoor Workplaces.

Employees in indoor workplaces, such as maintenance facilities, and warehousing, can be exposed to HRIs when ambient temperatures increase. See Table IX-1—Facility Types Analyzed in OSHA's Preliminary Technological Feasibility Analysis. Due to factors such as building materials, insulation, and reduced air movement, the air temperatures in indoor workplaces without air-conditioning can in some cases exceed the temperature outdoors. The proposed rule would require that employers reduce these exposures by utilizing controls to cool the work area and provide a break area that is air-conditioned or has an alternate means of providing air movement and, if appropriate, humidity control to promote evaporative and convective cooling.

In response to the Advanced Notice of Proposed Rulemaking (ANPRM) and previous Requests for Information (RFI), OSHA received numerous comments on the use of engineering controls for preventing heat-related injury and illness in both indoor and outdoor work settings. The most mentioned engineering controls were the provision of air-conditioning, fans, swamp coolers (i.e., evaporative coolers), portable air-conditioners, access to air-conditioned zones, air-conditioned tents/trailers and shaded areas. (e.g., Document ID 0094; 0206; 0278, Att. 1; 0392; 0448, Att. 1; 0523, Att. 1; 0551; 0562; 0588; 0610, Att. 1; 0637, Att. 1: 0679, Att. 1). Some commenters mentioned specific types of devices that could be used, such as portable air-conditioning units and evaporative coolers. (e.g., Document ID 0445; 0595, Att. 1; 0612, Att. 1). For preventing humid working conditions, commenters suggested the use of dehumidifiers. (Document ID 0661, Att. 1). OSHA discusses of the feasibility of these controls below.

Some commenters suggested other controls, such as architectural controls like altering roofs to reflect solar radiation using reflective materials, green roofs, rooftop sprinklers, or painting roofs white. Also suggested was the use of light-colored building material, green infrastructure, pervious pavements, external awnings, and window coverings to aid in mitigating indoor heat. While OSHA understands that the use of these controls may assist an employer in reducing ambient heat exposures in the workplace, this analysis focuses on the engineering controls outlined specifically in the regulatory text of the proposed rule. OSHA notes, however, that the proposed standard does not prohibit the use of other controls in addition those specified in the standard.

I. Air-Conditioning.

Air-conditioning is one of the options to control heat in the workplace and is the most effective way to reduce heat strain because it reduces the heat exposure directly (Day et al., 2019; Jay et al., 2019; Morris et al., 2020; Morrissey et al., 2021b). Air-conditioning technology is widely available and currently in use in many workplaces. However, OSHA understands that the use of air-conditioning to address heat hazards may not be practical in all occupational settings, such as outdoors or in large factories, and alternative control strategies need to be implemented (Foster et al., 2020; Mekjavic et al., n.d.; Morris et al., 2020).

HEAT-SHIELD, a research program funded by the European Union, evaluated strategies for the reduction of heat illness in the manufacturing industry (Mekjavic et al., n.d.). Researchers from the Heat Shield project successfully implemented several heat stress mitigating strategies within a manufacturing plant producing automobile rear lights. To aid in enhanced evaporative heat loss by the workers, the production hall was fitted with a system of ducts to increase the cooling air flow to the production hall and local workstations. The ducts were installed so that the air flow in the plant could be individually adjusted at the local workstations; alternatively, individual workers could also use an electrical fan in proximity to their workstation to increase the air flow (Mekjavic et al., n.d.). The study does not indicate what method of cooling was used to cool the air provided (conditioned, evaporative cooling, etc.). However, OSHA believes that similar designs could be implemented in manufacturing facilities using conditioned air.

In response to the ANPRM, some commenters stated that temperature controls or air-conditioning systems are not feasible in many industrial settings and in large industrial plants that include tens of thousands of square feet of floor space, specifically foundries, forge shops, and other workplaces with hot work processes (e.g., Document ID 0277). Bakeries and dairy product manufacturers were specifically mentioned as having unique circumstances because of the need to offset carbon monoxide and heat emitted during the baking or production process for employee safety, and due to food safety concerns (Document ID 0699, Att. 1). Another commenter added that environmental temperature controls may not be feasible in some areas that are designed to be open or partially open to the outside. Installing air-conditioning in all work areas would not be physically possible and could be cost prohibitive (Document ID 0657, Att. 1; 0684, Att. 1; 710, Att. 1; 0724, Att. 1). This sentiment was also echoed in available literature. Mekjavic et al. noted that due to design elements of some manufacturing facilities, such as minimal insulation, the economic burden renders the installation of facility wide air-conditioning as not possible (Mekjavic et al., n.d.). OSHA understands this concern and is therefore not requiring all employers to install air-conditioning throughout their facility.

However, OSHA recognizes that air-conditioning can be installed in some indoor locations and is effective at reducing the exposure to ambient heat in the workplace. A feasibility study presented at the 10th International Livestock Environment Symposium compared the costs and benefits of air-conditioning to an evaporative cooling system in a large dairy barn (measuring 43.3m by 25.6m) (Li et al., 2018). The researchers simulated summer conditions in barns across Tampa, FL; Sacramento, CA; Syracuse, NY; and Madison, WI. They determined that air-conditioning was capable of maintaining maximum indoor temperatures of 23°C to 27.4°C (74.3°F to 81.3°F) (Li et al., 2018).

Another study conducted by Morrissey et al. (2021b) provided a flow chart for selecting appropriate heat controls and included air-conditioning as a recommended option for all work sites with access to power. Anderson and Souza (2017) specifically identify air-conditioning (i.e., bulk air cooling, spot air coolers, and air-conditioned cabins) as a heat management strategy for underground mines. In addition, several commenters on the ANPRM noted that some indoor facilities do provide areas for employees to take breaks in temperature-controlled environments, indicating that an air-conditioned break area is capable of being installed for cooling in indoor work environments (Document ID 0612, p. 2; 0680, p. 10; 0691, pp. 10-11; 0777, Att. 2, p. 33; 1071, p. 2; 1072, pp. 1, 4).

Despite common statements of its efficacy in review articles and studies, air-conditioning as a control to reduce heat exposure at the workplace is not commonly evaluated in the occupational setting. It is unclear if the very definition of air-conditioning (an approach that directly removes heat) or feasibility limitations might explain the limited nature of this body of literature. Therefore, OSHA is seeking information regarding the current use of air-conditioning in the industries covered under the scope of the rule.

II. Humidity Control.

For indoor work sites, OSHA is proposing to require employers who do not provide air-conditioned break areas or workspaces to implement humidity control (when appropriate) in conjunction with some form of air movement in those spaces. An article by D. Jeff Burton, P.E. CIH, published in the Occupational Health and Safety magazine reviewed the use of dehumidification to maintain acceptable indoor air quality in occupational settings (Burton, 2006). In addition to dehumidification approaches utilizing existing HVAC systems, the article noted that stand-alone dehumidifiers are commercially available and can be used where HVAC systems do not effectively control humidity (Burton, 2006). Indeed, OSHA expects that in most cases employers will use one of the many stand-alone dehumidifier models on the market to achieve the humidity control required by the proposed standard. In addition, in facilities with processes that produce moisture, exhaust systems can often be used to remove moist air and eliminate humidity gain.

III. Fans.

Another engineering control identified by OSHA is the use of fans to help circulate air. Fans do not necessarily lower temperature but can make it easier for the body to dissipate heat. Depending on the work setting, fans can be used before work, during work, or during rest breaks. Information contained in the rulemaking docket indicates fans can be easily implemented in a variety of work environments. Large ceiling fans can be installed to increase air movement. In certain facilities, pedestal fans can be used to provide air movement at workstations. Some commenters mentioned that they use fans for air circulation in indoor facilities (e.g., Document ID 0277, 0283). During the SBREFA hearings, one SER reported that they open the doors in the mornings and use large ceiling fans to draw cooler air into the building, and then shut the doors in the afternoons to reduce the infiltration of hot outside air into the building. (Document ID 1081, p. 29).

Several studies evaluated by OSHA indicate that fan usage in industrial settings is prevalent. A recent J. J. Keller Center for Market Insights Pulse Poll indicates that 65% of employers provide fans, ventilation, or reflective shields to help control exposures to heat stress (JJ Keller, 2022).

As mentioned above, HEAT-SHIELD evaluated strategies for the reduction of heat illness in the manufacturing industry (Mekjavic et al., n.d.). To aid in enhanced evaporative heat loss by the workers, the production hall was fitted with a system of ducts to increase the cooling air flow to the production hall and local workstations. In addition, some workers utilized electrical fans in proximity to their individual workstations to increase the air flow (Mekjavic et al., n.d.).

A 2021 study by Morris et al. determined that facilitated ventilation, through the use of electric fans, supports convective and/or evaporative heat loss and lowers occupational heat strain at a considerably lower operation and production cost compared to air-conditioning. The authors noted that fans were also easier to personalize cooling by directing air flow towards specific workers, rather than cooling an entire area; they could be transported to remote workspaces and could be used both during work and at specific cooling areas where workers take intermittent cooling breaks (Morris et al., 2021).

Fans have even been incorporated into chairs as demonstrated by Watanabe et al. (2009). In this study, researchers evaluated thermal comfort using chairs with attached fans under various climactic conditions, while participants performed light office tasks such as word processing. One control chair and two “fan chair” designs were assessed; each “fan chair” had a fan under the seat and behind the backrest and received a positive response from the worker. Morris et al. (2020) also noted the relevance of chair fans, stating that “miniature electrical fans could be incorporated into chairs, for seated workers, to deliver effective cooling while minimizing disturbances to the work environment” (Morris et al., 2020).

There is an additional body of research investigating fans as a heat control in large dairy barns due to the sensitivity of cow productivity to heat stress. Although not directly applicable to HRI reduction in humans, as with air-conditioning described above, this research provides insight into the extent to which industrial fans can be installed in large barn or warehouse-like structures (Calegari et al., 2012; Correa-Calderon et al., 2004; Davidson et al., 2021; Drwencke et al., 2020; Ortiz et al., 2010; Shiao et al., 2011; Urdaz et al., 2006).

Evidence of the existing use of fans in occupational settings can be seen in existing state requirements and in some collective bargaining agreements. For example, Minnesota’s standard governing indoor ventilation and temperature includes a provision for providing indoor ventilation and acceptable temperature ranges in places of employment to prevent employee exposure to indoor environmental heat conditions (MN Admin. Code 5205.0110). In addition, comments from the Teamsters in response to the ANPRM included examples of collective bargaining agreements that demonstrate steps employers have taken to address occupational HRIs (Document ID 0707, pp. 14-17). Items included provisions for work area ventilation when the plant is hot and the installation of fans to reduce excess heat or humidity in work rooms. Employers covered under these agreements may already be in compliance with some of the requirements of the proposal.

Although fan use can be effective at reducing heat stress, fans may introduce additional hazards in some workplaces due to the increase in air movement. In indoor settings where air contamination is a concern, the use of fans may interfere with existing ventilation and increase worker exposure to hazards. OSHA acknowledges that in some cases, the work site may need to be evaluated to ensure that the use of fans does not interfere with existing ventilation designed for the control of dust and other air contaminants. OSHA seeks comments on work settings where the use of fans is not feasible due to contamination concerns and requests additional information on what controls, including the use of air-conditioning, employers use to prevent heat-related illnesses in these settings.

In addition, research has shown that under certain conditions (e.g., high temperatures), fan use can increase the hazard of heat strain. See Section V.C., Risk Reduction for a more detailed discussion of fan use alone during elevated temperature events. OSHA requests comments on indoor work settings that may experience temperatures above 102°F and seeks information on what controls employers implement when fan use is contraindicated or when temperatures exceed 102°F.

IV. Evaporative Coolers.

Another engineering control, evaporative coolers, work by using a fan to pass air over a pad or ceramic surface saturated with water. The evaporation of the water reduces the air temperature. In warm dry climates, evaporative coolers can be used to lower air temperatures as much as 20°F (USGS). They consume much less energy than air-conditioning and can be used in buildings with openings to the outside. However, because evaporative coolers cool through increasing air humidity, they are not as effective at relative humidity above 60%.

A NIOSH Health Hazard Evaluation (HHE) conducted in September 2006 demonstrates the feasibility of evaporative cooler use in indoor workspaces. The evaluation was conducted at a glass manufacturing facility in Indiana. In the hot end of the glass-making process, raw materials (recycled glass, sand, soda ash, and limestone) were melted together in a gas furnace at temperatures of 2,300°F to 2,800°F (Dowell & Tapp, 2007). The company used various controls in the hot end of the plant during the hot summer months to reduce the risk of heat-related illness. The controls included fans which supplied cooler air from the basement of the facility (man coolers), and evaporative cooling fans (swamp coolers) (Dowell & Tapp, 2007).

Furthermore, portable evaporative coolers are also commercially available for use expanding the ability for implementation in various work settings. These coolers can lower air temperatures by up to 18°C (33°F) and cover up to 6,500 sq ft area, requiring only a power outlet and water supply.

V. Preliminary Feasibility Finding for Indoor Workplaces.

OSHA has determined that requirements for the use of engineering controls indoors under the proposed standard are technologically feasible for most operations, most of the time. For break areas, the proposed rule allows employers to utilize available air-conditioning systems or a combination of air movement and humidity control to promote evaporative cooling. The latter can be achieved with widely available fans and humidity control devices. For indoor work areas, OSHA has provided the employer with multiple control options for compliance with the proposed rule, allowing them to tailor the controls to the individual workplaces. Information obtained through the SBREFA process, comments, and research into existing control use indicate that many employers are already utilizing some combination of the required control options. OSHA seeks additional comments on its assumptions and other control options for these workers.

Based on the discussion above, OSHA has determined that there are no technological hurdles to compliance with this requirement in the proposed rule.

B. Outdoor Workplaces.

For outdoor workplaces, the primary sources of exposure to heat hazards are ambient heat and direct sunlight. Under the proposed rule, OSHA is requiring employers to provide a break area with shade or air-conditioning.

I. Shade.

As discussed in Section V., Risk Assessment*,* access to shade can reduce the risk of HRI by decreasing exposure to solar radiation and, in turn, reducing overall heat load. Research has found that total heat exchange is greater in shaded conditions than sunny conditions (Otani et al., 2021), indicating that access to shaded areas may reduce HRI. For outdoor workers exposed to direct sunlight, a commonly used engineering control is the use of a shelter or canopy to provide a shaded area for rest breaks. A wide variety of portable pop-up canopies are commercially available that can be easily set up and moved around for mobile work sites. Note that the proposed rule would not allow mobile equipment or machinery to be used to provide shade for rest breaks due to the potential safety hazards from unintended or accidental start up and movement of the equipment and the potential for equipment to release radiant heat.

Working or resting in the shade can reduce the risk of HRI by decreasing exposure to solar radiation and reducing overall heat load. This control is applicable to all outdoor industries and is a key component of OSHA's "Water. Rest. Shade." Heat Campaign guidance. The feasibility of providing shade for rest periods is demonstrated by OSHA enforcement data. During inspections conducted under the 2023 Heat National Emphasis Program, OSHA Compliance Officers completed a questionnaire regarding work site conditions. Over 1,300 responses were received indicating that 96% of employers inspected provided access to cool shaded areas (OSHA, 2023b). Several states, including California, Oregon, Colorado and Washington, have also incorporated requirements to provide shade into their heat-specific standards.[143] While the scope of coverage varies by state, these standards require employers to provide workers with shade structures for rest breaks to recover from the heat. In addition, Maryland and Nevada proposed rules that would also require employers to provide access to shade.[144]

The addition of shaded break areas has been demonstrated as an integral part of a heat health plan to improve worker performance in the agricultural sector (Bodin et al., 2016; Morris et al., 2020; Glaser et al., 2022). Bodin et al. (2016) implemented a water, rest, and shade campaign with 56 Salvadoran sugarcane workers two months into the harvest season. Workers were provided a canopy for shaded breaks, insulated water bladders, and fixed break times. A qualitative study of the intervention reported consistent use of the shaded canopies and high worker satisfaction. A similar study of sugar cane workers conducted in 2022 indicated that workers were provided with break periods under adequate natural shade or tents that were designed to be moved easily to accompany the mobile workforce throughout each day. Tents were constructed from a

[143] (CA 8 CCR 3395; OR Admin. Code 437-002-0156 and 437-004-1131; CO 7 CCR 1103-15:3; and WA Admin. Code 296-62-09535)

[144] Maryland COMAR 09.12.32; and Nevada Proposed Regulation LCB File No. R053-20.

netted fabric, open on two sides to provide adequate ventilation, and provided with stools for seated, shaded rest (Glaser et al., 2022).

OSHA acknowledges that providing stationary shading outdoors may be difficult in some settings, particularly where work crews are highly mobile, such as in agricultural work. Even so, several studies indicate the widespread use of shade among agricultural workers. Fleischer et al. (2013) conducted a cross-sectional survey on HRI symptoms and working conditions in Georgia in 2011. Of the 405 farmworkers who completed the survey, 27% reported not having access to shade, indicating that some form of shade is available in the majority of these work environments. A study by Bethel et al. (2017) comparing conditions for outdoor agricultural workers in Oregon and Washington found that workers in Oregon more frequently reported the presence of shade structures[145] and workers in Washington more often reported access to shade from trees[146]. In Oregon, workers more frequently reported using shade structures and cars with air-conditioning compared with workers in Washington[147]. However, the study was subject to several limitations. First, different methods of data collection were used in Oregon and Washington, which could have led to information bias. Participants in Washington completed a self-administered survey on touchscreen tablets at the work site, whereas participants in Oregon completed a personal interview administered by research staff at the housing facility. Second, participants were recruited differently in the two states, via

[145] 29% use in Oregon vs. 5% in Washington
[146] 92% in Washington vs. 47% in Oregon
[147] In Oregon, 26% of workers reported using shade structures and 14% used cars with air conditioning, compared to 3% and 6% (respectively) in Washington

outreach workers in Oregon and via employers and supervisors in Washington. Next, the conditions in which participants in the two states worked were vastly different. Specifically, participants in Washington primarily picked tree fruit in orchard settings, which provided a natural form of shade, whereas participants in Oregon primarily harvested blueberries with little shade (Bethel et al., 2017).

The Fair Food Program is a partnership between growers and agriculture workers that includes safety and health standards which require participating employers to provide shade, water, bathrooms, and rest breaks. According to their 2021 report, 100% of Participating Growers have purchased and distributed shade structures to their crews, and they have observed steady increases in the quality of shade units at many growers' operations, including custom designs built to withstand field conditions. (Fair Foods Standards Council, 2021)

During the SBREFA hearings, some SERs with outdoor settings reported using engineering controls such as natural shade (e.g., trees and dense vegetation), pop-up canopies, umbrellas, and portable shades. Some SERs with outdoor settings said they believed some engineering controls including shade and fans were infeasible for their workplace. (Document ID 1081, p. 30).

II. Air-Conditioning for outdoor workers.

Access to air-conditioning for outdoor work settings is primarily provided through the use of vehicles, trailers, and near-by buildings. OSHA understands that the use of air-conditioning has limited applications for outdoor workplaces. However, evidence in the docket indicates that it is feasible for a variety of outdoor situations.

A 2018 study by Methner and Eisenberg evaluated the risk of HRI for employees engaged in strenuous work in an extremely hot outdoor environment, a park during summer months. Worker tasks included landscaping, demolition, and bricklaying. Park policy included the use of motor vehicles with air-conditioning as a cool-down area for breaks in remote locations where access to cooled buildings was limited (Methner and Eisenberg, 2018). As mentioned above Bethel et al. (2017) found that some workers in Oregon and Washington have access to cars with air-conditioning (14% vs. 3%).

The use of portable air-conditioning units and vehicles with air-conditioning for cooling is also supported by multiple ANPRM commentors. In response to OSHA's request for information on control options for outdoor work, the City of Phoenix commented that portable air-conditioning units are available and have received positive responses from employees. The International Brotherhood of Electrical Workers (IBEW), AFL-CIO also indicated that employees in the utilities industry use a wide variety of cooling methods including air-conditioning in trucks or trailers.

During the SBREFA hearings, many SERs with outdoor work settings reported having air-conditioned vehicles or trailers on site that workers can use to cool down. When SERs were polled at two sessions, September 12th and 13th, on the types of engineering controls that are used "to mitigate the impact of heat exposure to employees that work outdoors," two-thirds (66.7%) of the 30 responders reported using an "air-conditioned space." (Document ID 1081, p. 30).

OSHA requests comments on additional ways employers have utilized air-conditioning for outdoor workers and obstacles encountered, if any.

III. Preliminary Feasibility Finding for Outdoor Workplaces.

OSHA has preliminarily determined that requirements for the use of engineering controls for outdoor break areas under the proposed standard are technologically feasible for most operations, most of the time. Information obtained through the SBREFA process, comments, and research into existing control use indicate that many employers are already utilizing some form of shade or air-conditioned space for employee cooling. For those remaining employers, OSHA anticipates they can quickly come into compliance through the implementation of shade or air-conditioned vehicles, trailers and other spaces, as described above. OSHA seeks additional comments on its assumptions and other control options for these workers. Based on the discussion above, OSHA has determined that there are no technological hurdles to compliance with this requirement.

C. Mobile Workplaces.

Options for the use of engineering controls for mobile work sites where the work is not performed at a fixed location are similar to other outdoor work sites. Portable canopies can be used to provide a shaded area for breaks. Where electricity is available, trailers with air-conditioning can be used as cool-down areas for rest breaks. Air-conditioned vehicle cabs can also be used.

OSHA found several examples in which employers agreed to provide shade for outdoor workers as part of contract negotiations around working conditions. As previously mentioned, the Teamsters submitted comments on the ANPRM that included examples of language from collective bargaining agreements demonstrating steps employers have taken to address occupational HRIs. Language included requirements for construction drivers, employees suffering from heat illness believing a preventative recovery period is needed or feeling the need to protect themselves from overheating, are required to be provided access to an area with shade that is either open to the air or provided with ventilation for a period of no less than five minutes (Document ID 0707, p. 16).

I. Preliminary Feasibility Finding for Mobile Workplaces.

OSHA has preliminarily determined that there are no technological hurdles for the implementation of controls for workers with mobile work sites. Based on the discussion above, OSHA has preliminarily determined that it is technologically feasible, using commercially available products and technology, for employers with mobile work sites to provide workers with shaded or air-conditioned break areas. OSHA seeks comment on this determination and additional data and information on other feasible control options available for these mobile work sites.

E. Preliminary Feasibility Findings.

OSHA has reviewed the requirements that would be imposed by the proposed standard and has determined that achieving compliance with the proposed standard is technologically feasible most of the time, in most of the establishments and operations covered by the standard. As discussed above, the proposed rule is largely programmatic and offers the employer several control options. Under the proposed rule, employers can determine the controls best suited for their unique work environment in order to comply with the requirements for controls at break areas and work areas. Not all practices, procedures, or controls identified in this technological feasibility analysis will be necessary at all establishments: the proposed standard provides flexibility for employers to tailor their procedures, practices, and controls to the needs of their facility based on an assessment specific to that facility. Moreover, readily available and currently used technology is capable of meeting these requirements.

As part of this analysis, OSHA reviewed the heat injury and illness prevention practices currently in place across the affected industries as well as the recommended practices of industry trade associations and standards-setting organizations. On the basis of current compliance found by OSHA, widespread familiarity with the concepts and procedures contained in the proposed rule, and the availability of control options, OSHA has determined the requirements of the proposed rule are capable of being done by most employers, most of the time and therefore preliminarily determined that compliance with the proposed rule is technologically feasible.

F. Additional Information Requested.

OSHA requests comments on the appropriateness of the preliminary determinations contained in this analysis.

Regarding the feasibility of monitoring, OSHA seeks additional comments and information regarding:

- The feasibility of measuring HI in indoor environments and where heat-generating processes occur.
- The use of WBGT including the identification of situations in which WBGT would or would not be practical or pose challenges for employers to measure.

Regarding the feasibility of controls, OSHA seeks additional comments and information on the following:

- Whether there are other controls or technologies that may be available to protect workers against heat hazards.
- The technological feasibility of other engineering control options not discussed here for indoor, outdoor, and mobile work sites.
- The feasibility of dehumidification as a control option for indoor workplaces.
- Areas where employers have determined that isolation of heat producing equipment is not feasible and alternatives employers have utilized to reduce employee exposures.
- The current use of air-conditioning in the industries covered under the scope of the rule.
- Additional ways employers have utilized air-conditioning for outdoor workers and obstacles encountered, if any.
- The current use and application of fans in both indoor and outdoor settings.
- Work settings where the use of fans is not feasible due to contamination concerns and information on what controls, including the use of air-conditioning, employers use to prevent HRIs in these settings.
- Indoor work settings without heat-generating processes that may experience temperatures above 102°F and information on what controls employers implement when fan use is contraindicated or when temperatures exceed 102°F.

X. Additional Requirements

A. Unfunded Mandates Reform Act, 2 U.S.C. 1501 et seq.

OSHA reviewed this proposed rule according to the Unfunded Mandates Reform Act of 1995 (UMRA) (2 U.S.C. 1501 et seq.) and Executive Order 12875 (58 FR 58093). Section 202 of the UMRA, 2 U.S.C. 1532, requires agencies to assess the anticipated costs and benefits of a rule that includes a Federal mandate that may result in expenditures in any one year by State, local, and tribal governments, in the aggregate, or by the private sector, of at least $100 million, adjusted annually for inflation. In 2024, that threshold is $183 million.

Although OSHA may include compliance costs for affected State Plan governmental entities in its analysis of the expected impacts associated with a proposal, this proposed rule does not place a mandate on State or local government, for purposes of the UMRA. See the discussion below in Section X.G., Federalism.

The OSH Act does not cover tribal governments in the performance of traditional governmental functions, but it does cover tribal governments when they engage in activities of a commercial or service character (see *Menominee Tribal Enters. v. Solis*, 601 F.3d 669 (7th Cir. 2010); *Reich v. Mashantucket Sand & Gravel*, 95 F.3d 174, 180 (2nd Cir. 1996)). However, the cost of the proposed rule for these covered activities by a tribal government would not meet the threshold established in the UMRA. As noted below, OSHA also reviewed this rulemaking in accordance with Executive Order 13175 on Consultation and Coordination with Indian Tribal Governments (65 FR 67249 (November 9, 2000)) and determined that it does not have ‘‘tribal implications’’ as defined in that Executive Order.

Based on the analysis presented in the Preliminary Economic Analysis and Initial Regulatory Flexibility Analysis, Section VIII. of this preamble, OSHA concludes that the proposed rule would impose a Federal mandate on the private sector of $100 million or more annually, adjusted for inflation. The Preliminary Economic Analysis constitutes the written statement containing a qualitative and quantitative assessment of the anticipated costs and benefits required under section 202(a) of the UMRA (2 U.S.C. 1532(a)).

B. Consultation and Coordination with Indian Tribal Governments/Executive Order 13175.

OSHA reviewed this proposed rule in accordance with Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, 65 FR 67249 (Nov. 6, 2000), and determined that it does not have ‘‘tribal implications’’ as defined in that order. As explained above, the OSH Act does not cover tribal governments in the performance of traditional governmental functions, so except to the extent a tribe is engaged in activities covered by this proposed rule that would fall outside of a traditional government function (i.e., activities of a commercial or service character), the proposed rule would not have substantial direct effects on one or more Indian tribes in their sovereign capacity, on the relationship between the Federal Government and Indian tribes, or on the distribution of power and responsibilities between the Federal Government and Indian tribes (see E.O. 13175 section 1(a)).

Section 5 of the Executive Order requires agencies to consult with tribal officials early in the process of developing regulations that: (1) have tribal implications, impose substantial direct compliance costs on Indian governments, and are not required by statute; or (2) have tribal implications and preempt tribal law (E.O. 13175 section 5(b), (c)). The Executive Order requires that such consultation occur to the extent practicable.

On May 15, 2024, OSHA held a listening session with tribal representatives regarding this Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings rulemaking. OSHA provided an overview of the rulemaking effort and sought comment on what, if any, tribal implications would result from the rulemaking. A summary of the meeting and list of attendees can be viewed in the docket (DOL, 2024a).

C. Consultation with the Advisory Committee on Construction Safety and Health.

Under 29 CFR parts 1911 and 1912, OSHA must consult with the Advisory Committee on Construction Safety and Health (ACCSH), established pursuant to section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704), in setting standards for construction work. Specifically, 29 CFR 1911.10(a) requires the Assistant Secretary to provide ACCSH with any proposal (along with pertinent factual information) and give ACCSH an opportunity to submit recommendations. See also 29 CFR 1912.3(a).

At a public meeting on April 24, 2024, OSHA presented to ACCSH its framework for a proposed rule for heat injury and illness prevention in outdoor and indoor work settings. The Committee then passed unanimously a motion recommending that OSHA proceed expeditiously with proposing a standard on heat injury and illness prevention. The Committee also recommended that OSHA consider the feedback and questions discussed by Committee members during the meeting in formulating the proposed rule (see the minutes from the meeting, Docket No. 2024-0002). OSHA has considered the Committee's feedback in the development of this proposal.

D. Environmental Impacts.

OSHA reviewed the proposed rule according to the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 et seq.), the regulations of the Council on Environmental Quality (CEQ) (40 CFR chapter V, subchapter A), and the Department of Labor's NEPA procedures (29 CFR part 11). Pursuant to 29 CFR 11.10 and consistent with CEQ regulations, the promulgation, modification, or revocation of any safety standard is categorically excluded from the requirement to prepare an environmental assessment under NEPA absent extraordinary circumstances indicating the need for such an assessment. OSHA finds that this proposed rule presents no such extraordinary circumstances.

E. Consensus Standards.

OSHA must consider adopting existing national consensus standards that differ substantially from OSHA's proposed standard if the consensus standard would better effectuate the purposes of the Act (see 29 U.S.C. 655(b)(8); see also National Technology Transfer and Advancement Act of 1995, Public Law 104–113, section 12(d), 15 U.S.C. 272 Note). Whenever an OSHA rule differs substantially from a national consensus standard, OSHA must publish in the *Federal Register* a statement of the reasons why the rule will better effectuate the purposes of the Act than the national consensus standard (29 U.S.C. 655(b)(8)). In the development of the proposed rule, OSHA reviewed the ANSI/ASSP national consensus Standard for Heat Stress Management in Construction and Demolition Operations, A10.50-2024. Many of the proposed provisions are consistent with the ANSI/ASSP standard, although there are some differences in the details of the provisions, particularly in the scope of the standard, as well as requirements for measurements, heat trigger levels, hydration, rest breaks, medical surveillance, PPE, recordkeeping, and a qualified person.

Regarding the scope of the standard, while the ANSI/ASSP standard applies only to employers in construction and demolition operations, the OSHA proposed standard applies to all employers in general industry, construction, maritime, and agriculture, with some exceptions (as discussed in Section VII.A., Explanation of Proposed Requirements). While both the ANSI/ASSP standard and the OSHA proposed standard would require employers to develop a written heat stress management program and acclimatization plan, the ANSI/ASSP standard requires a competent person to perform a heat stress task hazard analysis and indicates that workers' heat exposure should be assessed by use of the WBGT index or other heat stress index that accounts for climatic and metabolic heat sources and modification of heat transfer from the worker by extra clothing or PPE. The OSHA proposed standard requires that employers monitor heat conditions but allows employers more flexibility to determine workers' heat exposure. For example, in outdoor work areas, the OSHA proposed standard allows employers to track local heat index forecasts or measure heat index or WBGT, while for indoor work areas the OSHA proposed standard requires the employer to identify work areas with hazardous heat exposure and develop and implement a monitoring plan that includes measurement of heat index or WBGT. For workplaces in which employees where vapor-impermeable clothing, the employer's HIIPP must specify procedures to protect employees while wearing vapor-impermeable clothing. OSHA is allowing employers this additional flexibility to determine workers' heat exposure through multiple options based on feedback from public commenters and small entity representatives that WBGT can be technically challenging to measure accurately and that, for outdoor work areas, weather forecasts are readily available and easy to monitor (see Section IX., Technological Feasibility). In addition, with the exception of Minnesota, none of the current or proposed heat-specific state regulations rely on WBGT.

With respect to the heat trigger levels at which certain control measures are specified, the ANSI/ASSP standard and OSHA proposed standard also deviate slightly. While the ANSI/ASSP standard sets an action level of WBGT adjusted for clothing type (clothing-adjusted WBGT) of 70°F or heat index adjusted for radiant heat (adjusted heat index) of 80°F, the OSHA proposed standard specifies an initial heat trigger of WBGT equal to the NIOSH RAL or a heat index (unadjusted) of 80°F. The ANSI/ASSP standard's moderate hazard action level is a clothing-adjusted WBGT of 80°F or an adjusted heat index of 95°F, while the OSHA proposed standard specifies a high heat trigger of WBGT equal to NISOH REL or a heat index (unadjusted) of 90°F. Additionally, the ANSI/ASSP standard has an extreme hazard action level of a clothing-adjusted WBGT of 87°F or an adjusted heat index of 110°F, at which point ANSI/ASSP recommends stopping work that requires high strenuous workload. While the ANSI/ASSP and OSHA initial and high heat triggers are similar, OSHA is not specifying a third trigger in its proposed standard. This decision is in line with recommendations from the SBAR Panel to keep the heat triggers simple to understand (see SBAR Panel findings and recommendations, Section VIII., Preliminary Economic Analysis and Initial Regulatory Flexibility Analysis). Adding a third trigger could also add considerable costs. As explained in Section V.B., Basis for Initial and High Heat Trigger, OSHA's proposed triggers are based on observational and laboratory evidence and, the agency believes, represent a highly sensitive and appropriate screening threshold for heat stress controls in the workplace. OSHA has preliminarily determined that these thresholds are protective for workers and achievable for employers.

With regards to hydration, both the ANSI/ASSP standard and the OSHA proposed standard would require that employees have access to suitably cool water that is free of charge, in close proximity to working areas, and of sufficient quantity. The ANSI/ASSP standard, however, additionally requires that employees shall have access to electrolyte replenishment beverages when they are involved with heavy work activities for greater than two hours. The OSHA proposed standard does not have this requirement, as the agency heard from an ACCSH member that electrolyte replenishment beverages can contain sugar that cannot be consumed by all workers. NIOSH, in its hydration fact sheet, recognizes that sports drinks with balanced electrolytes can replace salt lost in sweat, but similarly notes that heavy consumption will add calories due to the added sugar. NIOSH also points out, "In general, eating regular meals with adequate water is sufficient to maintain water and electrolyte balance" (NIOSH, 2017a). As a result, the OSHA proposed rule does not require employers to provide electrolyte replenishment beverages but OSHA notes in this preamble that employers may provide electrolyte replenishment beverages in addition to water if they choose to do so (see Section VII., Explanation of Proposed Requirements). OSHA also requests comment on whether the agency should require the provision of electrolyte supplements/solutions in addition to water.

Another deviation between the ANSI/ASSP standard and the OSHA proposed standard exists in the requirement for rest breaks. While both the ANSI/ASSP standard and the OSHA proposed standard require employers to provide shaded rest and hydration break areas at or above the action level or initial heat trigger, respectively, the ANSI/ASSP standard recommends, but does not require, scheduled rest breaks at the moderate hazard action level (a clothing-adjusted WBGT or 80°F or an adjusted heat index of 95°F). OSHA's proposed standard requires employers to provide a rest break if needed to prevent overheating at or above the initial heat trigger, as well as a rest break of at least 15 minutes every two hours at or above the high heat trigger. Rest breaks, particularly in combination with water and shade, have been shown in multiple scientific studies to reduce the risk of heat-related fatality and HRI (see Section V.C., Risk Reduction) and therefore OSHA is requiring rest breaks in the proposed standard.

Regarding medical surveillance, the ANSI/ASSP standard indicates that a medical surveillance program (e.g., a comprehensive work and medical history, a comprehensive physical exam, an assessment of any personal risk factors, and the ability to wear PPE) should be established for all workers covered by the standard, while the OSHA proposed standard does not have a medical surveillance requirement. Similarly, while both the ANSI/ASSP standard and the OSHA proposed standard require that an employee exhibiting signs or symptoms of heat illness be monitored and not left alone or sent home without being offered on-site first aid and, if necessary, emergency medical services, the ANSI/ASSP standard further requires that a supervisor or team member be trained in first aid and certified in cardiopulmonary resuscitation (CPR) and the use of the automated external defibrillator (AED) when a medical professional is not available on-site. Due to the widespread scope of the OSHA proposed standard, the agency believes that a requirement for medical surveillance or for certification of supervisors or team members in CPR and AED would be impractical and could add considerable costs. In addition, OSHA also heard a comment from a construction industry representative during the ACCSH consultation that requiring medical surveillance would also be logistically difficult (see the minutes from the meeting, Docket No. 2024-0002).

With respect to PPE, the ANSI/ASSP standard requires the implementation of heat stress controls following the hierarchy of controls, with engineering controls implemented first, followed by administrative controls, and then cooling PPE. While the OSHA proposed standard specifies the use of engineering controls and administrative controls, it does not require the use of cooling PPE. OSHA believes that cooling PPE—such as a cooling vest—has the potential to become hazardous as the cooling properties dissipate. As a result, the OSHA proposed standard requires that employers who choose to provide cooling PPE to their employees ensure that the cooling properties of the PPE are maintained at all times during use (see Section VII.E., Paragraph (e) Requirements at or above the Initial Heat Trigger).

With regards to recordkeeping, the ANSI/ASSP standard requires employers to keep a written inventory of local conditions at the work site that affect or increase the potential for heat stress only as long as the hazard exists or as required by law. The OSHA proposed standard is more specific, requiring that employers maintain written or electronic records of indoor work area measurements for 6 months (see Section VII.I., Paragraph (i) Recordkeeping). OSHA believes this specificity increases clarity for employers.

Finally, the ANSI/ASSP standard requires a qualified person "who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project." The ANSI/ASSP standard requires that the qualified person assist with the development and review of the heat stress management program, the use and interpretation of the WBGT, and the development and review of the first aid and emergency action plan, as well as providing guidance or in-person support to the competent person on implementation of the program as needed. The OSHA proposed standard does not have a requirement for a qualified person. Due to the widespread scope of the proposed standard, OSHA does not believe that it would be feasible to require all covered employers to hire a qualified person as contemplated by the ANSI/ASSP standard. Instead, the proposed standard requires the designation of one or more heat safety coordinators who are trained in and responsible for ensuring compliance with all requirements of the employer's HIIPP. OSHA also plans to provide compliance assistance materials such as a model HIIPP and other materials.

OSHA also notes that there are some requirements in its proposed standard that are not required by the ANSI/ASSP standard. Specifically, the OSHA proposed standard contains a hazard alert provision that requires employers to notify employees that the high heat trigger has been met or exceeded (see Section VII.F., Paragraph (f) Requirements at or above the High Heat Trigger). The OSHA proposed standard also requires that employers place warning signs at indoor areas with ambient temperatures that regularly exceed 120°F (see Section VII.F., Paragraph (f) Requirements at or above the High Heat Trigger). OSHA believes that these additional requirements are important for the protection of workers from heat hazards in the workplace.

OSHA has preliminarily determined that the proposed standard would be highly effective at addressing the risk of occupational heat exposure while remaining workable across the many different work contexts covered by the proposal. As such, OSHA believes that the standard as proposed will best effectuate the OSH Act's purpose of ensuring safe and healthful working conditions.

F. Protection of Children from Environmental Health Risks and Safety Risks.

Executive Order 13045, on Protection of Children from Environmental Health Risks and Safety Risks, as amended by Executive Orders 13229 and 13296, requires that Federal agencies provide additional evaluation of economically significant regulatory actions that concern an environmental health or safety risk that an agency has reason to believe may disproportionately affect children. This proposed rule is intended to protect United States workers from occupational hazards. OSHA has preliminarily determined that the proposed rule will not disproportionately affect children or have any adverse impact on children. Because workers in the industries covered by this proposed rule may include older children, the proposed rule could have a protective effect on these older children in the workforce by reducing the possibility of heat-related injury or illness. Accordingly, E.O. 13045, Protection of Children from Environmental Health Risks and Safety Risks, requires no further agency action or analysis.

G. Federalism.

The agency reviewed this proposed rule in accordance with Executive Order 13132 on Federalism (64 FR 43255, (August 10, 1999)), which, among other things, is intended to "ensure that the principles of federalism established by the Framers guide the executive departments and agencies in the formulation and implementation of policies." The E.O. generally allows Federal agencies to preempt State law only as provided by Congress or where State law conflicts with Federal law. In such cases, Federal agencies must limit preemption of State law to the extent possible. The E.O. also requires that agencies consult with states on rules that have "federalism implications," which are those that have "substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government."

This proposed rule complies with E.O. 13132. The hazards addressed by this proposed rule and its goal of protecting workers from exposure to hazardous heat are national in scope and the proposed rule does not include "federalism implications" as defined in the E.O. Under Section 18 of the OSH Act (29 U.S.C. 667), Congress expressly provided that States may adopt, with Federal approval, a plan for the development and enforcement of occupational safety and health standards. OSHA refers to the occupational safety and health plans that have been submitted by States and approved by OSHA as "State Plans." Occupational safety and health standards developed by States with OSHA-approved State Plans must be at least as effective in providing safe and healthful employment and places of employment as the Federal standards. Subject to these requirements, these States are free to develop and enforce their own occupational safety and health standards. The choice to adopt a State Plan is part of the statutory scheme and is not mandatory, so there are no federalism implications for states that choose to do so.

In States without OSHA-approved State Plans, the States are not employers under to the OSH Act and the proposed rule would therefore not have a substantial direct effect on them (29 USC 652(5)). The following section addresses the effect of the proposed rule on States with OSHA-approved State Plans.

H. Requirements for States with OSHA-Approved State Plans.

When Federal OSHA promulgates a new standard or a more stringent amendment to an existing standard, States and U.S. Territories with OSHA-approved State Plans must either amend their standards to be identical to or "at least as effective as" the new standard or amendment or show that an existing State Plan standard covering this area is already "at least as effective" as the new Federal standard or amendment (29 CFR 1953.5(b)). State Plan adoption must be completed within six months of the promulgation date of the final Federal rule.

Of the 29 States and Territories with OSHA-approved State Plans, 22 cover both public and private-sector employees: Alaska, Arizona, California, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Washington, and Wyoming. The remaining seven States and Territories cover only State and local government employees: Connecticut, Illinois, Maine, Massachusetts, New Jersey, New York, and the Virgin Islands.

OSHA preliminarily concludes that this proposed rule would increase protections beyond those provided by most current standards in State Plans. Therefore, within six months of any final rule's promulgation date, States with OSHA-approved State Plans would be required to adopt standards that are identical to or "at least as effective" as this rule, unless they demonstrate that such amendments are not necessary because their existing permanent standards are already "at least as effective" in protecting workers. OSHA seeks comment on this assessment of its proposal.

I. OMB Review Under the Paperwork Reduction Act of 1995

A. Overview.

The proposed Heat Injury and Illness Prevention Standard contains collection-of - information requirements that are subject to the Office of Management and Budget (OMB) review and approval under the Paperwork Reduction Act of 1995 (PRA), 44 U.S.C. 3501 et seq. and its implementing regulations at 5 CFR part 1320. The PRA defines a collection-of-information as the obtaining, causing to be obtained, soliciting, or requiring the disclosure to third parties or the public of facts or opinions by or for an agency regardless of form or format. (See 44 U.S.C. 3502(3)(A)). The collection of information requirements specified in the proposal would reduce the risk of death, serious injury, and illness by ensuring that employers develop and implement a worksite heat injury and illness prevention plan (HIIPP), review and evaluate the effectiveness of the HIIPP, designate one or more heat safety coordinators to implement and monitor the HIIPP, and develop and implement a heat illness emergency response plan to respond to employees experiencing signs and symptoms of heat related illnesses for indoor and outdoor conditions. OSHA is requesting OMB approval of the proposed Information Collection Request (ICR) and a new OMB Control Number for this ICR currently under OMB Control Number 1218-0NEW.

Under the PRA, a Federal agency cannot conduct or sponsor a collection of information unless OMB approves it, and the agency displays a currently valid OMB control number (44 U.S.C. 3507). Also, notwithstanding any other provision of law, no employer shall be subject to penalty for failing to comply with a collection of information if the collection of information does not display a currently valid OMB control number (44 U.S.C. 3512).

B. Solicitation of Comments.

In accordance with the PRA (44 U.S.C. 3506(c)(2) and 3507(d)), OSHA submitted the collection-of-information requirements identified in the NPRM to OMB for review. The agency solicits comments on the collection-of-information requirements and estimated burden hours associated with these requirements, including comments on the following items:

- Whether the proposed collections of information are necessary for the proper performance of the agency's functions, including whether the information is useful;
- The accuracy of OSHA's estimate of the burden (time and cost) of the proposed collections of information, including the validity of the methodology and assumptions used;
- The quality, utility, and clarity of the information collected; and
- Ways to minimize the compliance burden on employers, for example, by using automated or other technological techniques for collecting and transmitting information (78 FR 56438).

C. Proposed Collection of Information Requirements.

As required by 5 CFR 1320.5(a)(1)(iv) and 1320.8(d)(1), the following paragraphs provide information about this ICR.

1. *Title*: Heat Injury and Illness Prevention Standard (29 CFR 1910.148).
2. *Description of the ICR*: The proposal would add new collection-of-information requirements to protect indoor and outdoor workers from hazardous heat.
3. *Brief Summary of the Collection of Information Requirements*: The proposed Heat Injury and Illness Prevention Standard ICR adds new collection-of-information requirements that would ensure that employers develop and implement a worksite heat injury and illness prevention plan, review and evaluate the effectiveness of the HIIPP, designate one or more heat safety coordinators to implement and monitor the HIIPP, and develop and implement a heat illness emergency response

plan for employees experiencing signs and symptoms of heat related illnesses for indoor and outdoor workers. Specifically, the proposed collection-of-information requirements contained in the proposed rule for the Heat Injury and Illness Prevention Standard are listed in Table X.I-1.

Table X.I-1 – Proposed Collection-of-Information Requirements for Heat Injury and Illness Prevention.

	Section	**Collection-of-Information Requirements**
1	**§ 1910.148(c)(1)-(4)**	(c) Heat Injury and Illness Prevention Plan. (1) The employer must develop and implement a work site heat injury and illness prevention plan (HIIPP) with site-specific information. (2) The HIIPP must include: (i) A comprehensive list of the types of work activities covered by the plan; (ii) All policies and procedures necessary to comply with the requirements of this standard; and (iii) An identification of the heat metric (i.e., heat index or wet bulb globe temperature) the employer will monitor to comply with paragraph (d). (3) If the employer has employees who wear vapor-impermeable clothing, the employer must evaluate heat stress hazards resulting from these clothing and implement policies and procedures based on reputable sources to protect employees while wearing these clothing. The employer must include these policies and procedures and document the evaluation in the HIIPP. (4) If the employer has more than 10 employees, the HIIPP must be written.
2	**§ 1910.148(c)(5)**	(5) The employer must designate one or more heat safety coordinators to implement and monitor the HIIPP. The identity of the heat safety coordinator(s) must be documented in any written HIIPP. The heat

	Section	Collection-of-Information Requirements
		safety coordinator(s) must have the authority to ensure compliance with all aspects of the HIIPP.
3	**§ 1910.148(c)(6) and (7)**	(6) The employer must seek the input and involvement of non-managerial employees and their representatives, if any, in the development and implementation of the HIIPP. (7) The employer must review and evaluate the effectiveness of the HIIPP whenever a heat-related illness or injury occurs that results in death, days away from work, medical treatment beyond first aid, or loss of consciousness, but at least annually. Following each review, the employer must update the HIIPP as necessary. The employer must seek input and involvement of non-managerial employees and their representatives, if any, during any reviews and updates.
4	**§ 1910.148(c)(8) and (9)**	(8) The employer must make the HIIPP readily available at the work site to all employees performing work at the work site. (9) The HIIPP must be available in a language each employee, supervisor, and heat safety coordinator understands.
5	**§ 1910.148(d)(3)**	(3) Indoor work. (i) At indoor work sites, the employer must identify each work area(s) where there is a reasonable expectation that employees are or may be exposed to heat at or above the initial heat trigger. (ii) The employer must develop and implement a monitoring plan covering each work area identified in paragraph (d)(3)(i) to determine when employees are exposed to heat at or above the initial and high heat triggers. The employer must include the monitoring plan in the HIIPP and the monitoring plan must include measuring one of the following at or as close as possible to the work area(s) identified in paragraph (d)(3)(i): (A) Heat index, or ambient temperature and humidity measured separately to calculate heat index; or

	Section	Collection-of-Information Requirements
		(B) Wet bulb globe temperature. (iii) Whenever there is a change in production, processes, equipment, controls, or a substantial increase in outdoor temperature which has the potential to increase heat exposure indoors, the employer must evaluate any affected work area(s) to identify where there is reasonable expectation that employees are or may be exposed to heat at or above the initial heat trigger. The employer must update their monitoring plan or develop and implement a monitoring plan, in accordance with paragraph (d)(3)(ii), to account for any increases in heat exposure. (iv) The employer must seek the input and involvement of non-managerial employees and their representatives, if any, when evaluating the work site to identify work areas with a reasonable expectation of exposures at or above the initial heat trigger and in developing and updating monitoring plans in accordance with paragraphs (d)(3)(i) through (iii).
6	**§ 1910.148(e)(7)**	(7) Acclimatization. (i) New employees. The employer must implement one of the following acclimatization protocols for each employee during their first week on the job: (A) A plan that, at minimum, incorporates the measures in paragraph (f) whenever the heat index is at or above the initial heat trigger during the employee's first week of work; or (B) Gradual acclimatization to heat in which the employee's exposure to heat is restricted to no more than: 20% of a normal work shift exposure duration on the first day of work, 40% on the second day of work, 60% of the third day of work, and 80% on the fourth day of work (ii) Returning employees. The employer must implement one of the following acclimatization protocols for each employee who has been away (e.g., on vacation or sick leave) for more than 14 days during their first week back on the job:

	Section	Collection-of-Information Requirements
		(A) A plan that, at minimum, incorporates the measures in paragraph (f) whenever the heat index is at or above the initial heat trigger during the employee's first week upon returning to work; or (B) Gradual acclimatization to heat in which employee exposure to heat is restricted to no more than: 50% of a normal work shift exposure duration on the first day of work, 60% on the second day of work, and 80% of the third day of work.
7	**§ 1910.148(e)(9)**	(9) *Effective communication*. The employer must maintain a means of effective, two-way communication with employees (e.g., by voice or electronic means (such as a handheld transceiver, phone, or radio)) and regularly communicate with employees.
8	**§ 1910.148(f)(4)**	(4) Hazard Alert. Prior to the work shift or upon determining the high heat trigger is met or exceeded, the employer must notify employees of the following: (i) The importance of drinking plenty of water; (ii) Employees' right to, at employees' election, take rest breaks if needed and the rest breaks required by paragraph (f)(2); (iii) How to seek help and the procedures to take in a heat emergency; and (iv) For mobile work sites, the location of break area(s) required by paragraph (e)(3) or (e)(4) and drinking water required by paragraph (e)(2).
8	**§ 1910.148(f)(5)**	(5) Excessively high heat areas. The employer must place warning signs at indoor work areas with ambient temperatures that regularly exceed 120°F. The warning signs must be legible, visible, and understandable to employees entering the work areas.
9	**§ 1910.148(g)(1)**	(g) Heat illness and emergency response and planning. (1) As part of their HIIPP, the employer must develop and implement as part of their HIIPP a heat emergency response plan that includes:

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		(i) A list of emergency phone numbers (e.g., 911, emergency services); (ii) A description of how employees can contact a supervisor and emergency medical services; (iii) Individual(s) designated to ensure that heat emergency procedures are invoked when appropriate; (iv) A description of how to transport employees to a place where they can be reached by an emergency medical provider; (v) Clear and precise directions to the work site, including the address of the work site, which can be provided to emergency dispatchers; and (vi) Procedures for responding to an employee experiencing signs and symptoms of heat-related illness, including heat emergency procedures for responding to an employee with suspected heat stroke.
	§ 1910.148(g)(3)	(3) If an employee is experiencing signs and symptoms of a heat emergency, the employer must: (i) Take immediate actions to reduce the employee's body temperature before emergency medical services arrive; (ii) Contact emergency medical services immediately; and (iii) Perform activities described in paragraph (g)(2)(i) through (g)(2)(iv).
10	**§ 1910.148(i)(1)**	(i) Recordkeeping. (1) If the employer conducts on-site measurements at indoor work areas pursuant to paragraph (d)(3)(ii), they must have written or electronic records of those indoor work area measurements and retain those records for 6 months.

4. *OMB Control Number*: 1218-0NEW.

5. *Affected Public:* Business or other for-profit.

6. *Number of Respondents*: 2,535,775.

7. *Frequency of Responses*: On occasion, annually.

8. *Number of Responses*: 1,699,783,434.

9. *Average Time Per Response*: Varies.

10. *Estimated total burden hours*: 27,803,599.

11. *Estimated costs (capital-operation and maintenance)*: $24,040,064.

D. Submitting Comments.

Members of the public may comment on the collection of information requirements in this proposed standard by sending their comments to the Office of Information and Regulatory Affairs, Attn: OMB Desk Officer for the Department of Labor, OSHA Regulation Identifier Number (RIN) (1218-AD39), by e-mail: *OIRA_submission@omb.eop.gov*. Please limit the comments to only those addressing the collection of information requirements in the proposed Heat Injury and Illness Prevention standard (i.e., proposed § 1910.148). OSHA encourages commenters also to submit their comments on these collection of information requirements to the rulemaking docket (OSHA-2021-0009), along with their comments on other parts of the proposed standard. For instructions on submitting these comments to the docket, see the sections of this *Federal Register* notice titled **DATES** and **ADDRESSES**. Comments submitted in response to this document are public records; therefore, OSHA cautions commenters about submitting personal information, such as Social Security numbers and dates of birth.

E. Docket and Inquiries.

To access the docket to read or download comments and other materials related to this paperwork determination, including the complete ICR, use the procedures described under the section of this notice titled **ADDRESSES**. You may obtain an electronic copy of the complete ICR by going to the website at *https://www.reginfo.gov/public/do/PRAMain*, then select "Department of Labor" under "Currently Under Review", then click on "submit". This will show all of the Department's ICRs currently under review, including the ICRs submitted for proposed rulemakings. To make inquiries, or to request other information, contact Ms. Seleda Perryman, Directorate of Standards and Guidance, Occupational Safety and Health Administration, U.S. Department of Labor; telephone (202) 693-4131; e-mail *perryman.seleda.m@dol.gov*.

XI. Authority and Signature:

This document was prepared under the direction of Douglas L. Parker, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Ave. NW, Washington, DC 20210. It is issued under the authority of sections 4, 6, and 8 of the Occupational Safety and Health Act of 1970 (29 U.S.C. 653,655, and 657); 5 U.S.C. 553, Secretary of Labor's Order No. 8-2020 (85 FR 58383), and 29 CFR part 1911.

Signed at Washington, DC, on ____________________________, 2024.

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Douglas L. Parker,
Assistant Secretary of Labor for Occupational Safety and Health.