

The background features a gradient from red at the top to blue at the bottom. On the left side, there are several technical diagrams, including a large circular scale with numerical markings from 140 to 260 in increments of 10. Other diagrams consist of concentric circles, dashed lines, and arrows, suggesting a technical or scientific theme.

HEAT STRESS PREVENTION

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OVERVIEW

- Extreme heat can be deadly ... BLS data show it killed 815 US workers and seriously injured more than 70,000 workers from 1992 through 2017
- Heat illness causes many times more workplace injuries than official records capture due to related injuries from falls, being struck by vehicles, and mishandling machinery due to heat stroke/stress and related difficulties in concentration or fainting
- Most outdoor heat fatalities (up to 70%) occur in first few days of working in hot environment – lack of acclimatization is a major risk factor for fatal outcomes
- Extreme heat threatens both outdoor workers (construction, mining, recreation) but also indoor workers in manufacturing plants, warehouses, cement operations and foundries
- 2021 UCLA study presented to Congress found that:
 - On days when temperature is between 85F and 90F, overall risk of injury (regardless of official cause) was 5-7% higher than on days when temps were in 60s
 - When temperatures top 100F, overall risk of injury was 10-15% greater
- Most heavily impacts low-income workers and persons in industries more likely to involve hazardous conditions to begin with versus workers employed in AC offices or workplaces
- More male workers are exposed to extreme heat, as are workers in their 20s and 30s

WHEN ARE WORKERS EXPOSED TO HEAT STRESS?

- Any indoor or outdoor process or job site that is likely to raise workers' deep core temperature
- Operations involving:
 - high air temperatures,
 - radiant heat sources,
 - high humidity,
 - direct physical contact with heat sources,
 - strenuous physical activities, and
 - work in places such as ceramic plants, boiler rooms, confined spaces, mining sites, smelters and foundries, and steam tunnels
- Age, weight, physical fitness, acclimatization, metabolism, dehydration, medical conditions including hypertension and renal disease can place workers at elevated risk

OSHA HEAT ILLNESS PREVENTION CAMPAIGN

WATER * REST * SHADE

- Launched in 2011 to educate employers & workers about dangers of working in the heat
- Uses training sessions, outreach to small business, publications, and social media
- Encourages employers to adopt effective heat illness prevention program that includes:
 - Providing workers with water, rest and shade
 - Allowing new/returning workers to gradually increase workloads as they acclimatize (build tolerance for heat)
 - Planning for emergencies and train workers on prevention
- ✓ Monitor co-workers for signs of heat illness – workers should also dress for the heat

FEDERAL OSHA & HEAT ILLNESS ENFORCEMENT

- OSHA does not have a specific standard covering heat stress hazards, the agency has previously cited employers who have allowed their employees to be exposed to serious physical harm from excessively hot work environments using the General Duty Clause, Section 5(a)(1) of OSH Act
- GDC requires each employer to, "furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm"
 - Employers can only be cited under GDC if their own workers are exposed to the hazard and there is a feasible method of abatement
 - Actions taken by employers to comply with other state law requirements can be imputed to show hazard recognition & feasibility of controls to support a GDC against a multi-state employer
- In 2019, OSHA lost key heat stress case where court held it could not use NWS "Heat Index" for enforcement - *Secretary of Labor v. A.H. Sturgill Roofing, Inc.*
- Agency now has heat illness prevention standard on regulatory agenda – RFI is due 10/2021

LEGISLATION TO REQUIRE HEAT ILLNESS STANDARD

- S 1068 and HR 2193 – **Asuncion Valdivia Heat Illness and Fatality Prevention Act of 2021**
- Legislation requires OSHA/ to promulgate an occupational safety or health standard on prevention of exposure to excessive heat
 - *Excessive heat* includes outdoor or indoor exposure to heat at levels that exceed the capacities of the body to maintain normal body functions and may cause heat-related injury, illness, or fatality.
- The legislation also establishes requirements concerning (1) training and education to prevent and respond to heat illness, and (2) whistle-blower protections
- Legislation has 9 co-sponsors in Senate; 53 co-sponsors in House (all Democrats)

FEDERAL OSHA GUIDANCE ON HEAT STRESS

OSHA says methods of abating heat stress hazards in workplaces include, but are not limited to:

1. Permitting workers to drink water or cold liquids (e.g., sports drinks) at liberty;
2. Establishing provisions for a work/rest regimen so that exposure time to high temperatures and/or the work rate is decreased;
3. Developing a heat stress program which incorporates the following:
 - a) A training program informing employees about the effects of heat stress, and how to recognize heat-related illness symptoms and prevent heat-induced illnesses;
 - b) A screening program to identify health conditions aggravated by elevated environmental temperatures;
 - c) An acclimation program for new employees or employees returning to work from absences of three or more days;
 - d) Specific procedures to be followed for heat-related emergency situations; and
 - e) Provisions that first aid be administered immediately to employees displaying symptoms of heat-related illness.

RELATED FEDERAL OSHA STANDARDS

- **PPE:** [29 CFR 1910.132\(d\)](#) requires every employer in general industry to conduct a hazard assessment to determine the appropriate PPE to be used to protect workers from the hazards identified in the assessment
 - See also [29 CFR 1915.152](#) (shipyard), [29 CFR 1917.95](#) (maritime) and both [29 CFR 1926.28](#) and [29 CFR 1926.95](#) (construction).
- **Recordkeeping & Reporting:** [29 CFR 1904](#) requires employers to record certain work-related heat illnesses
 - If worker requires intravenous fluids to treat a work-related heat illness, case meets the general recording criteria
 - If a worker is only instructed to drink fluids for relief of heat stress, the case is not recordable
 - 29 CFR 1904.39 requires employers to report to OSHA all work-related fatalities within 8 hours, and all work-related inpatient hospitalizations within 24 hour, including occupational heat-related events such as heat illness, heat stroke, kidney injury, and rhabdomyolysis that result in death or inpatient hospitalization
- **Sanitation:** [29 CFR 1910.141](#), [29 CFR 1915.88](#), [29 CFR 1917.127](#), [29 CFR 1918.95](#), [29 CFR 1926.51](#) and [29 CFR 1928.110](#) require employers to provide potable water
- **Medical Services and First Aid:** [29 CFR 1910.151](#), [29 CFR 1915.87](#), [29 CFR 1917.26](#), [29 CFR 1918.97](#), and [29 CFR 1926.50](#), require that persons on-site be adequately trained to render first aid, in the absence of medical facilities within close proximity (5 minutes/3 miles)
- **Safety Training and Education:** [29 CFR 1926.21](#) (construction)

STATE PLAN OSHA REGULATORY REQUIREMENTS

The following state plan OSHA agencies have adopted standards for heat exposure:

- **California:** California's Heat Illness Prevention Standard requires employers to provide training, water, shade, and planning. A temperature of 80°F triggers the requirements. See the full text of the [California heat standard](#)
 - NOTE: Former CalOSHA chief is Biden nominee to head federal OSHA!
- **Minnesota.** The standard applies to indoor places of employment. See the [full text of the regulation](#).
- **Washington:** See Washington State's [Outdoor Heat Exposure Rule](#). See the [full text of the regulation](#)
- **Oregon:** [OR-OSHA adopted temporary heat stress prevention standard 8/6/2021](#) in response to deadly heat events in Pac NW, but had begun rulemaking process in 2/21 ... the permanent rulemaking continues (OR-OSHA Administrative Order 6-20211)

OR-OSHA 2021 TEMPORARY HEAT STRESS RULE

- OR-OSHA rule offers protections in both indoor and outdoor environments, with exceptions for heat generated by a work process (e.g., foundries)
- When heat index temp in work area equals or exceeds 80F, temporary rule requires access to shade and drinking water for workers
- Rule adds practices for high-heat (when ambient heat index exceeds 90F) – and employers must have emergency medical plan in place describing procedures to be followed if heat illness occurs
- Employers must develop and implement an effective acclimatization practices
- By 8/1/21, Employers must ensure workers exposed to such conditions have training on heat-related illness and how to prevent it

COVID-19, HEAT STRESS & OUTDOOR WORKERS

- OSHA recognizes that for outdoor workers in construction, roofing, road work, agriculture, landscaping, delivery services, and oil/gas, use of cloth face coverings may be uncomfortable in hot & humid environments,
- In such situations, OSHA says employers should:
 - Acclimatize new and returning workers to environmental and work conditions while wearing cloth face coverings
 - Prioritize the use of cloth face coverings when workers are in close contact with others (less than 6') and during group travel or shift meetings
 - Allow workers to remove cloth face coverings when they can safely maintain 6-foot or greater distance from others
 - Evaluate feasibility of wearing cloth face coverings for each workers, consider alternatives such as face shields when appropriate
 - Increase frequency of hydration and rest breaks in shaded, non-enclosed or air conditioned areas
 - Incorporate at least 6-foot distancing into break areas by staggering breaks, spacing workers, and limiting number of workers on break at a time, where feasible

COVID-19, HEAT STRESS & INDOOR WORKERS

- OSHA recognizes that some indoor workers may also be at elevated risk of heat illness and face discomfort when wearing a cloth face covering
- Impacted industries include, but are not limited to:
 - Bakeries & kitchens,
 - Laundries,
 - Electric utilities,
 - Fire services,
 - Mills,
 - Foundries,
 - Manufacturing, and
 - Warehousing
- For such affected sectors, employers should follow the same recommendations as for outdoor work in terms of acclimatization, physical distancing, staggering breaks, consideration of face shields & alternative protections, and increased hydration and rest breaks

HEAT ILLNESS BASICS

- The average person takes about 5-7 days to adjust to hot weather
- On the first day of work in a hot environment the body temperature, pulse rate and general discomfort will be higher
- As the days go on, the body will become acclimated to the temperature
- Failure to follow appropriate precautions can result in a number of illnesses and even death:
 - Heat Cramps
 - Heat Exhaustion
 - Heat Stroke
 - Fainting & Dizziness
 - Heat Rash
 - Rhabdomyolysis

HEAT CRAMPS

- Heat Cramps are painful muscular spasms that happen suddenly and usually immediately after exertion
- Usually involves the muscles in the back of the leg (such as the calf or hamstring)
- How to treat....
 - Rest in a cool place
 - Drink cool water and/or sports drink
 - Stretch the cramped muscle

FAINTING & DIZZINESS (HEAT SYNCOPE)

- A worker who is not accustomed to hot environments and who stands without moving in the heat may faint
- With enlarged blood vessels in the skin and in the lower part of the body due to the body's attempt to control internal temperature, blood may pool there rather than returning to the heart
- Upon lying down, the worker should soon recover
- By moving around, and thereby preventing blood from pooling, the victim can prevent further fainting

HEAT RASH

- Heat rash, also known as prickly heat, is likely to occur in hot, humid environments where sweat is not easily removed from the surface of the skin by evaporation and the skin therefore stays wet most of the time
- The sweat ducts become plugged, and a skin rash soon appears
- When heat rash is extensive or when it is complicated by infection, it can be very uncomfortable
- The worker can prevent this condition by resting in a cool place and by regularly bathing and completely drying the skin

HEAT EXHAUSTION

- Heat exhaustion is characterized by heavy perspiration with normal or slightly above normal body temperatures
- It is caused by water and/or salt depletion
- Affects people that do not drink enough fluids while working or exercising in hot environments
- Symptoms of Heat Exhaustion
 - Severe thirst
 - Fatigue
 - Headache
 - Nausea
 - Vomiting
 - Sometimes Diarrhea
 - Uncontrolled Heat Exhaustion can evolve into Heatstroke

TREATING HEAT EXHAUSTION

- To treat Heat Exhaustion
 - Move the victim immediately out of the heat and to a cool place
 - Give cool liquids- cool water and/or sports drink
 - Raise the victims legs 8-12 inches
 - Remove excess clothing
 - Sponge victim's body with cool water and fan
 - If no improvement within 30 minutes- call EMS

HEAT STROKE: 911 TIME ????

Heatstroke is the most serious of health problems associated with working in hot environments

- Two types of Heatstroke exist-
- Classic Heatstroke- Also known as the “slow cooker”- may take days to develop
 - Often seen during summer heat waves and typically affects the elderly and sick.
 - Has a 50% death rate due to affecting the elderly
 - Results from a combination of a hot environment and dehydration
 - Sweating is absent
- Exertional Heatstroke- also know as the “fast cooker”
 - More common in the summer and usually affects athletes and laborers
 - Rapid onset does not allow enough time for severe dehydration to occur
 - 50% of Exertional Heatstroke victims are sweating
 - Classic Heatstroke victims are not sweating

SYMPTOMS & TREATMENT OF HEAT STROKE

- Signs and symptoms of Heat Stroke
 - Victim's body feels hot when touched
 - Possibly not sweating
 - Altered mental status- confusion/disorientation
 - Seizure and possible coma
- Treatment of Heat Stroke
 - Seek immediate medical attention-even if the victim seems to be re-covering
 - Move the victim immediately out of the heat
 - Remove clothing down to underwear
 - Keep the victim's head and shoulders slightly elevated
 - Cool the victim quickly by using cool water and ice packed around the neck, armpits, and groin
 - Body temperature is usually 105

RHABDOMYOLYSIS

- Medical condition, caused by heat stress and prolonged physical exertion – electrolytes and proteins are released into bloodstream
- Left untreated, this can result in kidney damage, irregular heart rhythms and death
- Symptoms include: muscle cramps, muscle pain, dark urine, weakness, exercise intolerance and joint pain and stiffness
- Rhabdomyolysis is usually diagnosed at hospital when tested, and treatment is based on condition and severity
 - Often extended hospitalization is involved

PERSONAL FACTORS IMPACTING HEAT ILLNESS

- Personal risk factors include:
 - Obesity (body mass index ≥ 30 kg/m²)
 - Diabetes
 - High blood pressure
 - Heart disease
 - Lower level of physical fitness
 - Use of certain medications such as diuretics (water pills) and some psychiatric or blood pressure medicines
 - Some medications can result in a worker's inability to feel heat conditions and/or the inability to sweat, so symptoms of heat stress may not be evident.
 - Alcohol use
 - Use of illicit drugs such as opioids, methamphetamine, or cocaine
- ✓ People with such pre-existing conditions who may be required to work in hot environments should consult their physician about what to do under these conditions
- Don't forget skin cancer risks – make sunscreen available for outdoor workers – use and reapply often – and consider clothing with sun protection built-in

SOLUTIONS: PLANNING & SUPERVISION

- Create heat illness prevention plan and consider issues including:
 - Who will provide daily oversight
 - How will new and returning workers gradually develop heat tolerance
 - How will you address temporary workers who may not be acclimatized
 - How will employer ensure first aid is adequate and emergency assistance is available
 - What engineering and work practices will be used to mitigate heat exposures
 - What work practices and administrative controls will be used to mitigate heat exposures
 - How will PPE use be impacted
 - How will employer respond when NWS issues a heat hazard alert or warning
 - What training will be provided to workers and supervisors
 - What will employer use to determine if actual total heat stress situation is hazardous to workers

SOLUTIONS: WORKER TRAINING

- Workers exposed to excessive heat situations should be trained on:
- Importance of proper hydration and need to drink fluids every 15-20 minutes
- Heat-protective clothing and equipment (including care and use)
- Human factors that can predispose workers to heat illness (medications, alcohol, obesity, heart conditions etc)
- How to acclimatize
- How and when to report symptoms, including observing co-workers for signs of heat illness
- How to respond to emergency weather bulletins

SOLUTIONS: H2O !!!

- To avoid heat illness, ensure workers have access to adequate, potable water – more than you'd think!
 - In the course of a day's work in the heat, the body may produce as much as 2-3 gallons of sweat
 - Because so many heat disorders involve excessive dehydration of the body, it is essential that water intake during the workday be about equal to the amount of sweat produced
 - Most workers exposed to hot conditions drink less fluids than needed because of an insufficient thirst drive
 - You therefore should not depend on thirst to signal when and how much to drink
 - You should drink about 5-7 ounces of fluids every 15-20 minutes to replenish the necessary fluids in the body
- ✓ Do NOT give workers salt tablets!

SOLUTIONS: PHYSIOLOGIC MONITORING

- Workers' bodies produce automatic responses to cope with heat stress. Heart rate increases. Sweating becomes more profuse. Eventually skin temperature and core body temperature rise – and these physiologic responses can be measured
- Physiologic monitoring has several advantages :
 - Physiologic responses provide a direct and individualized measurement of each worker's response to heat stress
 - Physiologic monitoring, such as heart rate measurement, can be used to determine whether their heat stress is too high
 - Physiologic measurements can be used to monitor the worker's level of heat tolerance.
 - Impermeable clothing, such as chemical protective suits, prevents cooling by sweating and may contribute to heat illness at lower temperatures.
 - Environmental monitoring (i.e., WBGT) does not give an accurate indication of these workers' heat stress. Heart rate is the easiest physiologic parameter to measure. A timepiece is the only required equipment. Workers can be trained to count their pulse. More sophisticated devices, such as heart rate monitor wristwatches, are also available.
 - Some employers also monitor weight changes during a work shift as a measure of water loss from sweating.
- ✓ Body temperature can be measured by thermometers but caution should be used when interpreting temperature measurements, because environmental heat might affect some thermometers.

SOLUTIONS: OSHA/NIOSH HEAT STRESS APP

- OSHA-NIOSH Heat Safety Tool is a useful resource for planning outdoor work activities based on how hot it feels throughout the day
 - It features real-time heat index and hourly forecasts, specific to your location, as well as occupational safety and health recommendations from OSHA and NIOSH that can be used by supervisors in the field for training
 - OSHA-NIOSH Heat Safety Tool features:
 - A visual indicator of the current heat index and associated risk levels specific to your current geographical location
 - Precautionary recommendations specific to heat index-associated risk levels
 - An interactive, hourly forecast of heat index values, risk level, and recommendations for planning outdoor work activities in advance
 - Editable location, temperature, and humidity controls for calculation of variable conditions
 - Signs and symptoms and first aid information for heat-related illnesses
- <https://www.cdc.gov/niosh/topics/heatstress/heatapp.html>

KEY CONSIDERATIONS ABOUT OSHA/NIOSH APP

- Heat index (HI) values were created for shady, light wind conditions, so exposure to full sunshine can increase heat index values by up to 15°F
- The simplicity of the HI makes it a good option for many outdoor work environments (as long as there are no additional radiant heat sources, such as, fires or hot machinery) ... but if you have the ability, NIOSH recommends using wet bulb globe temperature (WBGT)-based Recommended Exposure Limits (RELs) and Recommended Alert Limits (RALs) in hot environments
- Use of the HI or WBGT is important, but other factors such as strenuous physical activity also cause heat stress among workers. Employers should have a robust heat stress prevention program that ensures workers are protected
- *NIOSH and OSHA are currently considering new scientific data related to the HI levels, and considering how to best incorporate the evolving science.*
 - ✓ *It is important to regularly download updates to ensure you are using the latest version of the app*

OTHER RESOURCES FOR EMPLOYERS & WORKERS

- NIOSH. 2016. [Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments](#).
- ACGIH. Latest edition of its booklet: TLVs® and BEIs®. Addresses thermal stress: heat stress and heat strain
- [OSHA Technical Manual \(OTM\) Sections II and III: Chapter 4-Heat Stress](#)
- [A Guide to Heat Stress in Agriculture](#). OSHA and the Environmental Protection Agency (EPA), 1993 guide to help pesticide applicators and agricultural employers set up & operate heat stress control program
- Department of the Army and Air Force. 2003. [TB MED 507: Heat Stress Control and Heat Casualty Management](#). This document provides guidelines to protect military personnel from heat stress.
- [Common Heat Related Illnesses](#). National Oceanic and Atmospheric Administration (NOAA), National Weather Service. [First Aid for Heat Illness](#). NIOSH. A two-page fact sheet
- [Beat the Heat](#). CDC podcast about occupational heat-related illness, including a discussion of symptoms
- [Working in Hot Weather](#). CPWR, (2017). A one-page fact sheet for construction workers

KEEP COOL! QUESTIONS???



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