

HEAT STRESS: OVERVIEW & SOLUTIONS



A REAL PROBLEM

- ▶ **Heat stress can affect anyone.**
 - From Agriculture and Iron Workers to Football Players and Pastry chefs.
- ▶ **Heat stress can, and does, result in death.**
 - 1,680 recordable injuries due to environmental heat.
 - Of those, 150 resulted in a recordable “heat stroke.”
 - 26 resulted in death.

{*Bureau of Labor Statistics, 2008}

AWARENESS IS KEY



THE BASICS:

FACTORS CONTRIBUTING TO HEAT STRESS

PERSONAL:

- ▶ Age, weight, and personal fitness
- ▶ Dehydration and loss of electrolytes
- ▶ Illness // fever
- ▶ Medical conditions
- ▶ Certain medicines
- ▶ Diet // Alcohol
- ▶ Inadequate tolerance or adaptation to heat



THE BASICS:

FACTORS CONTRIBUTING TO HEAT STRESS

ENVIRONMENTAL:

- ▶ High temps
- ▶ Humidity
- ▶ Direct sun or heat
- ▶ Limited air movement
- ▶ Hot Equipment
- ▶ Heat reflected from ground or objects
- ▶ Physical exertion (i.e. work)
- ▶ Clothing and PPE



HEAT INDEX

Heat Index 130° or Higher

Heat Stroke or Sun Stroke imminent

Heat Index 105°-129°

Sun Stroke, heat cramps and heat exhaustion likely. Heat stroke possible with prolonged exposure and physical activity

Heat Index 90°-100°

Sun Stroke, heat cramps and heat exhaustion are possible with prolonged exposure and physical activity.

How To Use Heat Index

1. Across top (Air Temperature) locate today's predicted high temperature.
2. Down left side (Relative Humidity) locate today's predicted humidity.
3. Follow across and down to find "Apparent Temperature" or "What it feels like"

Heat Index Values were devised for shady, light wind conditions. Exposure to full sun can increase values by up to 15°. Strong winds, particularly with hot, dry air can be extremely hazardous.

Source: Centers for Disease Control and Prevention.

Air Temp.	70°	75°	80°	85°	90°	95°	100°	105°	110°
Relative Humidity	Apparent Temperature (Degrees Fahrenheit) →								
0%	64°	69°	73°	78°	83°	87°	91°	95°	99°
10%	65°	70°	75°	80°	85°	90°	95°	100°	105°
20%	66°	72°	77°	82°	87°	93°	99°	105°	112°
30%	67°	73°	78°	84°	90°	96°	104°	113°	123°
40%	68°	74°	79°	86°	93°	101°	110°	122°	137°
50%	69°	75°	81°	88°	96°	107°	120°	135°	150°
60%	70°	76°	82°	90°	100°	114°	132°	149°	
70%	70°	77°	85°	93°	106°	124°	144°		
80%	71°	78°	86°	97°	113°	136°	157°		
90%	71°	79°	88°	102°	122°	150°	170°		
100%	72°	80°	91°	108°	133°	166°			

KNOW THE SIGNS



THE BASICS:

WHAT IS A HEAT RELATED ILLNESS?

- ▶ **Heat Related Illness (HRI) and Heat Stress** are umbrella terms for a variety of physical conditions resulting from physical activity in hot or humid environments. Including:
 - heat rash
 - heat cramps
 - heat exhaustion
 - heat stroke



<u>Illness</u>	<u>Signs</u>	<u>Response</u>
Heat rash	<ul style="list-style-type: none"> • Red blister-like eruptions/bumps • Itching (prickly sensation) 	<ul style="list-style-type: none"> • Rest in a cool place • Allow the skin to dry • Monitor for infection
Heat cramps	<ul style="list-style-type: none"> • Painful spasms usually in legs or abdomen • Grasping the affected area • Possibly heavy sweating 	<ul style="list-style-type: none"> • Apply firm pressure and massage cramped area • Rest in a cool place • Drink water or an electrolyte drink • Seek medical attention if cramping is severe or does not go away
Heat exhaustion	<ul style="list-style-type: none"> • Headaches, light-headedness • Weakness • Mood changes, irritability or confusion • Feeling sick to your stomach and/or vomiting • Extreme sweating • Decreased and dark-colored urine • Pale clammy skin 	<ul style="list-style-type: none"> • Move the person to a cool, shaded area • Loosen and remove heavy clothing • Have the person drink some cool water • Get something cool on them • If the person does not feel better in a few minutes call for emergency help
Heat stroke	<ul style="list-style-type: none"> • Dry, pale skin • Sweating may still be present • Nausea and vomiting • Hot, red skin (looks like sunburn) • Mood changes, irritability, confusion, and not making any sense • Collapse (will not respond) • Fever (104°F or higher) 	<ul style="list-style-type: none"> • Call for emergency help (ambulance or 911) • Move the person to a cool, shaded area. Don't leave the person alone • Remove heavy and outer clothing • Have the person drink small amounts of cool water • Get something cool on them

WHO IS AT RISK?



IT CAN HAPPEN TO ANYONE

- ▶ Don't let your crew fall victim to:
 - “I’m tough – I don’t need a water break.”
 - “I’m not thirsty – I don’t need a drink.”
 - “I’ll lose pay if I take a water break.”
 - “I’ll be letting my team down.”
 - “I’m new here – I need to prove myself.”



Mild to moderate symptoms can quickly turn severe and result in hospitalization or even death. Do not wait to ACT!

THE BASICS:

RISKS OF NOT TAKING ACTION

▶ Worker Injury

- Cognitive abilities decrease. Slower reaction time and poor decision making can lead to injury.

▶ Property Loss or Damage

- Fine motor skills are often impaired when the body is under stress.

▶ Productivity Loss

- A stressed body cannot work at optimum speed or performance. Worker productivity declines as the effects of heat stress increase.

THE BASICS:

- ▶ Average workers' compensation claim for injuries related to excessive heat exposure **>\$9,000**
- ▶ Average cost per worker for a disabling lost-time injury: **>\$43,000**
 - \$5,000 increase since 2005
 - These numbers do not include other indirect costs
- ▶ For a fatal accident, the average economic cost by class and severity is approximately **\$1.3 million (per fatality)**

{*Bureau of Labor Statistics, 2008}

THE GOOD NEWS!

**Heat-Related Illness and Death are
100% Preventable**



AWARENESS & REGULATION

- ▶ OSHA's recent campaign to prevent heat illness in outdoor workers: Water, Rest, and Shade.
- ▶ Deep dive between 2005 and 2006: Cal/OSHA studied 71 serious heat-related enforcement investigations in California.
- ▶ The study revealed the real risk and dangers associated with heat stress.



WHAT WAS DISCOVERED

- ▶ Age of those affected ranged from 16 to 79.
- ▶ 69% of cases involved outdoor work.
- ▶ 48% of work was light to moderately strenuous.
- ▶ 61% of cases happened within 1st week on the job.
- ▶ 78% of those affected were dehydrated despite having drinking water available on the worksite.
- ▶ **30% of serious heat-related cases resulted in death.**
- ▶ Of those not resulting in death, 31% required.

**The study resulted in a
new California OSHA
standard centered
around heat stress
prevention.**

California Code of Regs, Title 8, 3395

THE CALI-EFFECT

California has historically been in the forefront of rule-making. Washington state has already adopted a version of this standard.



CAL/OSHA

KEY PROVISIONS

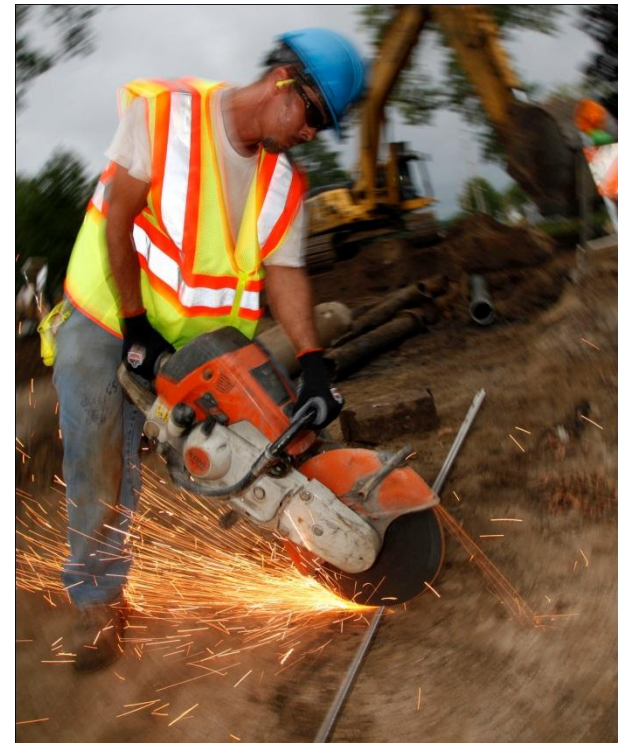
- ▶ **Definitions** – clearly define heat illness, etc.
- ▶ **Provision of Water** – 1 quart per employee per hour for entire shift, with frequent drinking encouraged, of potable drinking water. meeting the requirements of Sections 1524, 3363, and 3457.
- ▶ **Access to Shade** – must provide shaded area in open or with cooling for >5 minutes.
- ▶ **High Heat Procedures** – Temps >95° F (**NEW**).
- ▶ **Employee & Supervisor Training** – risks & signs of heat illness, importance of hydration.
- ▶ **Compliance** – failure to comply resulting in fines up to \$25,000 per violation.

CAL/OSHA

HEAT ILLNESS PREVENTION PLAN

► 3395(a) Scope & Application

- Applies to all outdoor places of employment (exception related to high-temp (e) provision).
- Industries subject to **ALL** provisions including (e):
 - o Agriculture
 - o Construction
 - o Landscaping
 - o Oil and gas extraction
 - o Transportation/delivery of agricultural products, construction materials or other heavy materials (e.g. furniture, lumber, industrial or commercial materials), except those that consist of operating an air-conditioned vehicle and don't include loading or unloading.



CAL/OSHA

HEAT ILLNESS PREVENTION PLAN

▶ 3395(b) Definitions

- “Heat Illness” is a serious medical condition resulting from the body's inability to cope with a particular heat load, and includes heat cramps, heat exhaustion and heat stroke.
- “Environmental risk factors for heat illness” means working conditions that create the possibility that heat illness could occur, including air temperature, relative humidity, radiant heat from the sun and other sources, conductive heat sources such as the ground, air movement, workload severity and duration, protective clothing and personal protective equipment worn by employees.



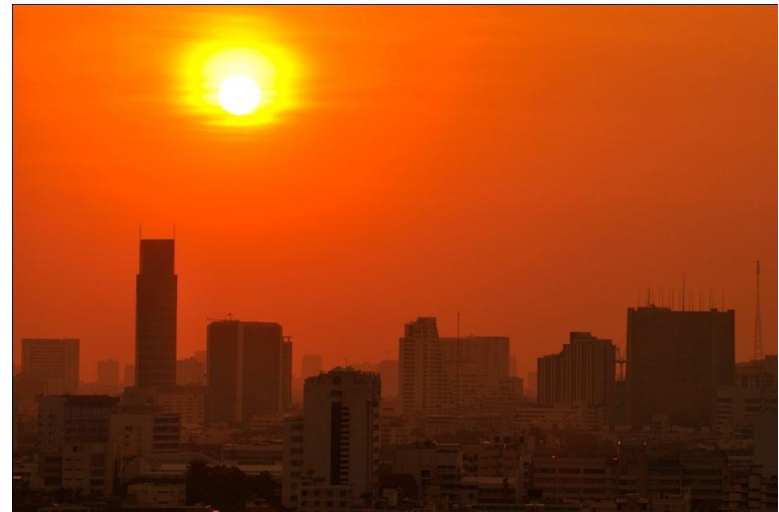
CAL/OSHA

HEAT ILLNESS PREVENTION PLAN

▶ 3395(b) Definitions Cont.

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

*Acclimatization peaks in most people within 4 - 14 days of regular work for at least 2 hours per day in the heat.



CAL/OSHA

HEAT ILLNESS PREVENTION PLAN

- ▶ **3395(c) Provision of Water**
 - Sufficient amounts of cool water available at all times with at least one quart per employee per hour for the entire shift.
 - Easy access to clean and cool water encourages frequent drinking.
 - Keep the water replenished.



CAL/OSHA

HEAT ILLNESS PREVENTION PLAN

► 3395(d) Access to Shade

- "Shade" means blockage of direct sunlight. One indicator that blockage is sufficient is when objects do not cast a shadow in the area of blocked sunlight. Shade is not adequate when heat in area of shade defeats the purpose (not allow the body to cool). Shade may be provided by any natural or artificial means that does not expose employees to unsafe or unhealthy conditions.
- Required when the temperature hits 85° F. Temps >95° F must be either open to the air to provide ventilation or cooling.
- Must accommodate 25% of workers at one site at one time.
- Employees shall be allowed and encouraged to rest in the shade for >5 minutes anytime they feel the need to do so.



CAL/OSHA

HEAT ILLNESS PREVENTION PLAN

- ▶ **3395(e) High Heat Procedures: Temps > 95° F (NEW)**
 - Ensure that effective communication by voice, observation, or electronic means is maintained so that employees at the work site can contact a supervisor when necessary. An electronic device, such as a cell phone, may be used for this purpose only if reception in the area is reliable.
 - Observe & monitor for heat illness symptoms.
 - Remind employees to drink plenty throughout shift.
 - Close supervision of a new hire for first 14 days of employment



CAL/OSHA

HEAT ILLNESS PREVENTION PLAN

► 3395(f) Employee & Supervisor Training:

- Environmental and personal risk factors for heat illness.
- Importance of frequent consumptions of small quantities of water.
- Importance of acclimatization.
- Different types of heat illness, common signs and symptoms.
- Importance of immediately reporting signs/symptoms of heat illness to supervisor.
- Procedures for responding to possible heat illness.
- Procedure for contacting and directing emergency medical services to worksite.
- Supervisor:
 - o All the above, plus:
 - o Procedures to follow to implement the applicable provisions of the standard.
 - o Procedures to follow when an employee exhibits symptoms consistent with heat illness, including emergency response & a designated person to be available to ensure that these happen.
 - o How to monitor weather reports and

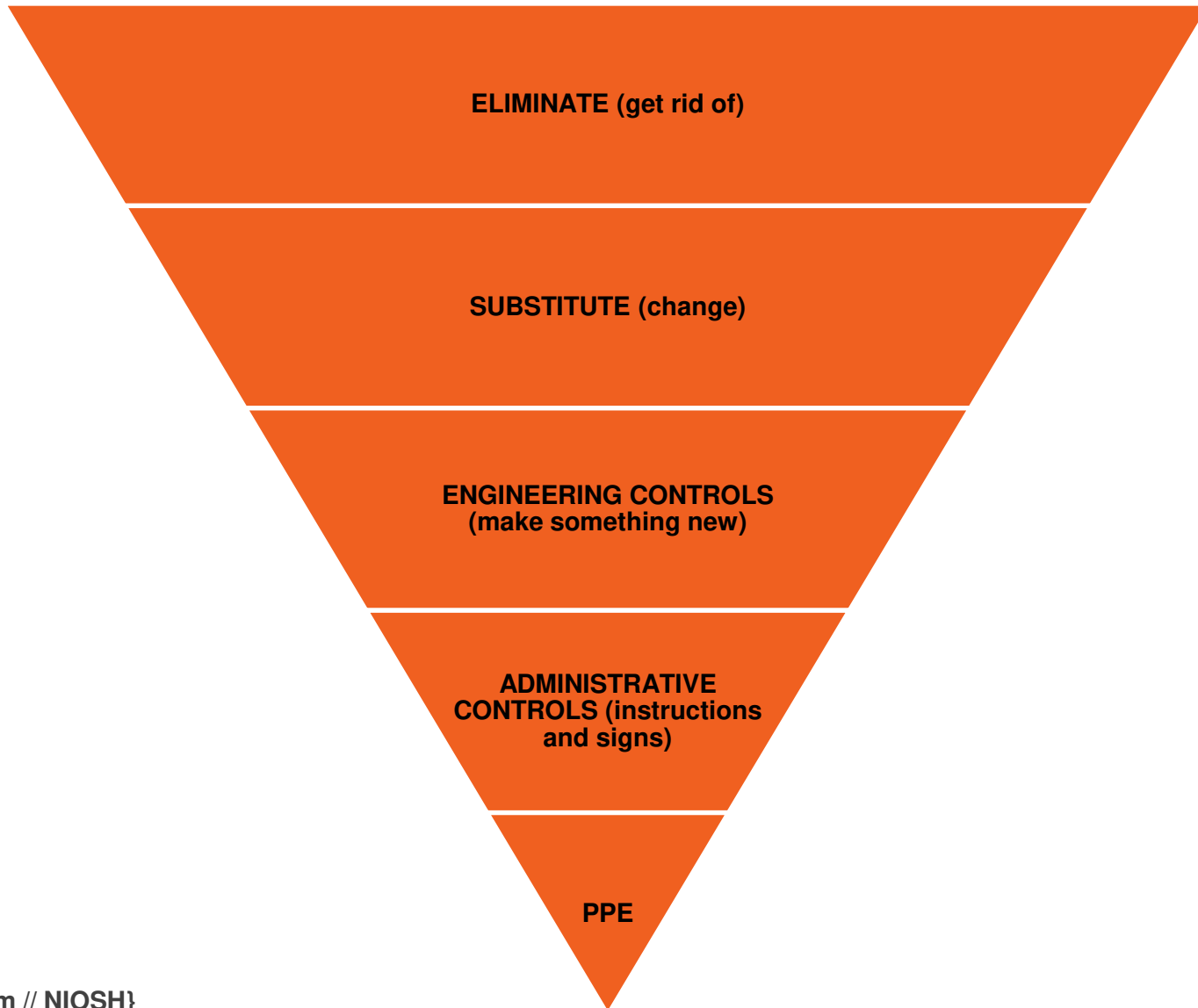


WHAT'S NEXT?

- » Not following Cal/OSHA guidelines could result in a fine up to \$25,000.
- » Not in California? Fines are still levied under OSHA's general duty clause for not following safe work practices.
- » **Bottom line: Heat Stress isn't going away. We need to address it head on and talk PREVENTION.**

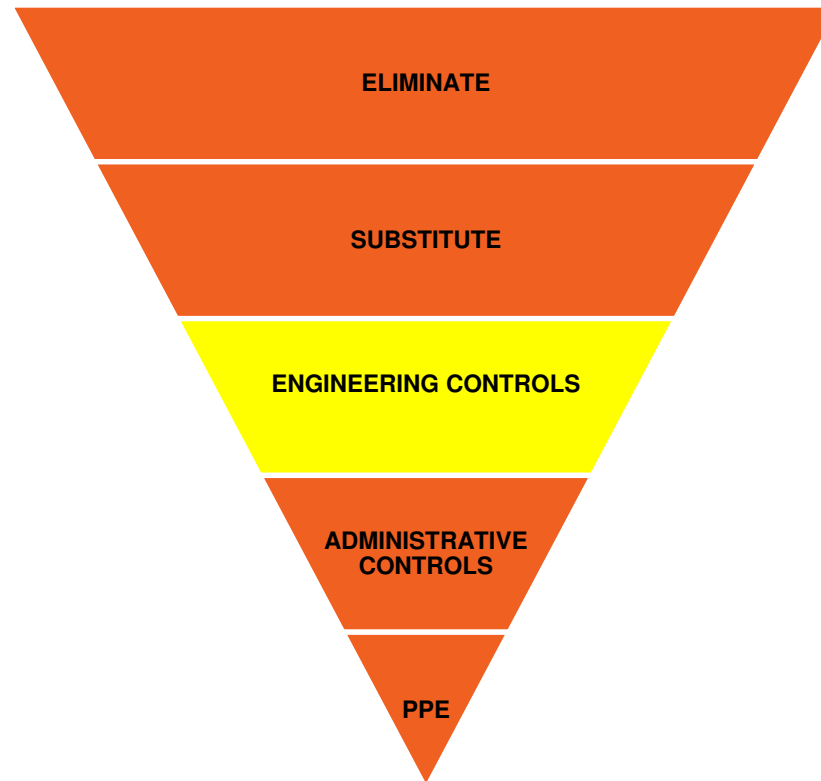
HEAT STRESS CONTROLS





{*CDC.com // NIOSH}

ENGINEERING



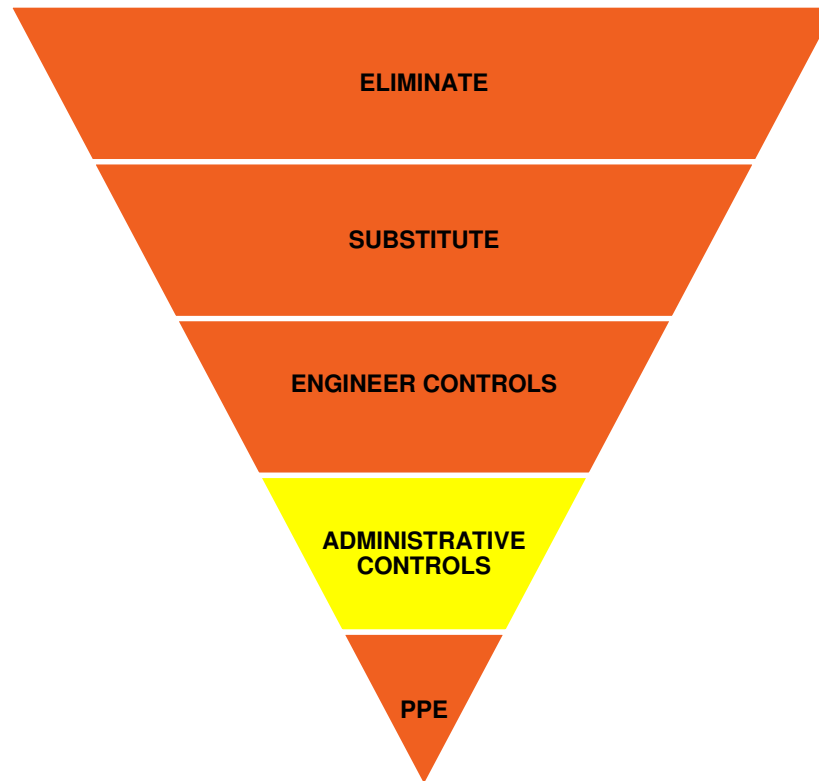
SHELTER

- ▶ Shelters provide a place for workers to get out of the sun.
- ▶ “Shade” means blockage of direct sunlight. Canopies, umbrellas and other temporary structures or devices may be used to provide shade.*
- ▶ Employees should have access to an area with shade that is either open to the air or provided with ventilation or cooling for a period of no less than 5 minutes whenever they need.



{*Cal/OSHA}

ADMINISTRATIVE



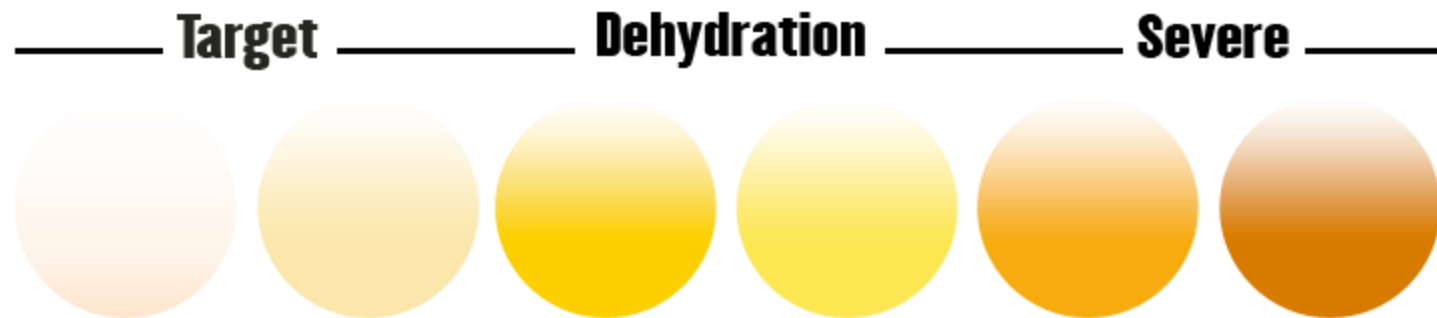
HYDRATION

- ▶ **Water is essential to good health.**
- ▶ **60 percent of your body weight is water.**
- ▶ **Water flushes toxins out of vital organs, carries nutrients to your cells and provides a moist environment for ear, nose, and throat tissues.**
- ▶ **Water regulates body temperature.**



HYDRATION

- ▶ You can monitor your hydration level by using the pee chart below.
- ▶ The color of your urine should match the targeted levels in the chart.



HOW IT WORKS

**8^{HOUR}
WORKDAY** = 8 LITERS OF SWEAT. OMG!



YES; IT'S ENTIRELY POSSIBLE. 8 LITERS OF SWEAT IN A DAY. ISH!

- ▶ **DEHYDRATION:** When you don't have enough fluid in your body to carry out normal functions, even mild dehydration can drain your energy and make you tired.
- ▶ **How do you lose fluid?**
 - Breathing, perspiration, urine and bowel movements.

BUT WHY THEN...

Did the Cal/OSHA study find that 78 percent of those affected by heat stress were dehydrated despite having drinking water available on the worksite?



ELECTROLYTE REPLENISHMENT

- ▶ The body cools itself by perspiring.
- ▶ What is lost is much more than just water; magnesium, potassium, sodium and calcium are also depleted. These minerals, or "electrolytes," are crucial to workers if they are to maintain healthy muscles and a productive energy level.
- ▶ Without electrolytes, workers become dehydrated and heat stress – or more serious injury – can be imminent.

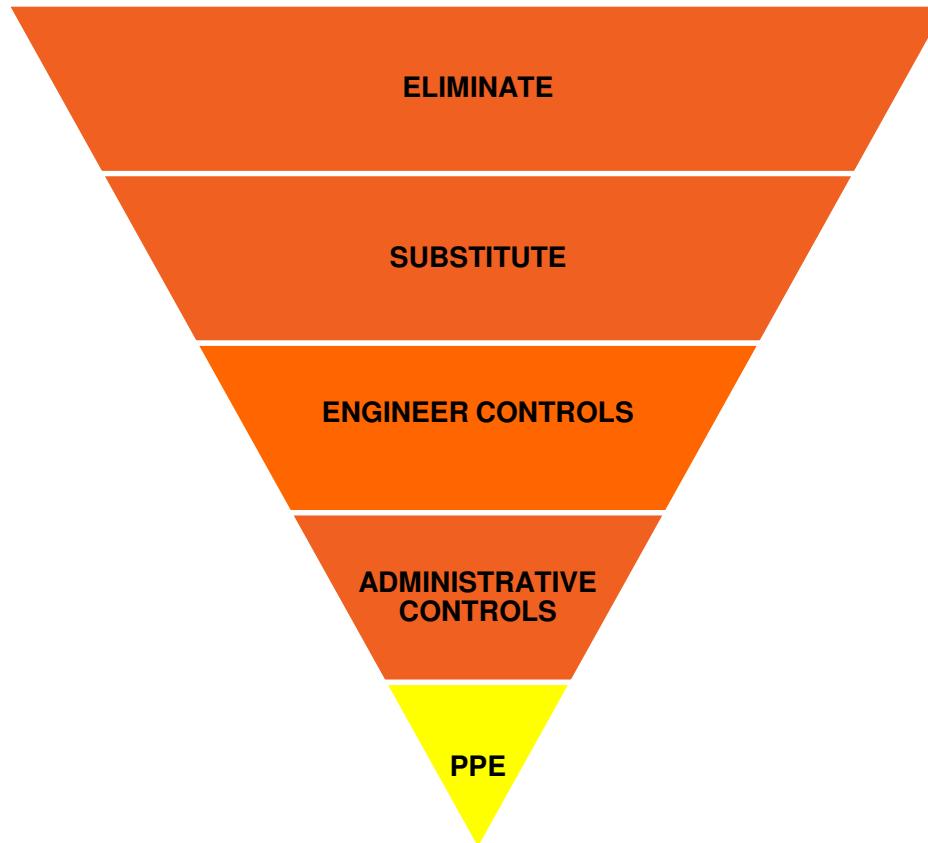


ELECTROLYTE REPLENISHMENT

- ▶ Water alone cannot sufficiently replace electrolytes to prevent heat stress.
- ▶ Pure water is absorbed slowly and cannot be retained in the extra cellular cavity. The rate of absorption of electrolyte drinks compared to water is significantly faster in the first minute.



PERSONAL PROTECTIVE EQUIPMENT



ABSORPTIVE

- ▶ The average person has 2.6 million sweat glands in their skin!
- ▶ Terry cloths, sponges, elastics and High-Performance technical fabrics trap or move sweat to keep it out of your eyes and off of your hands.



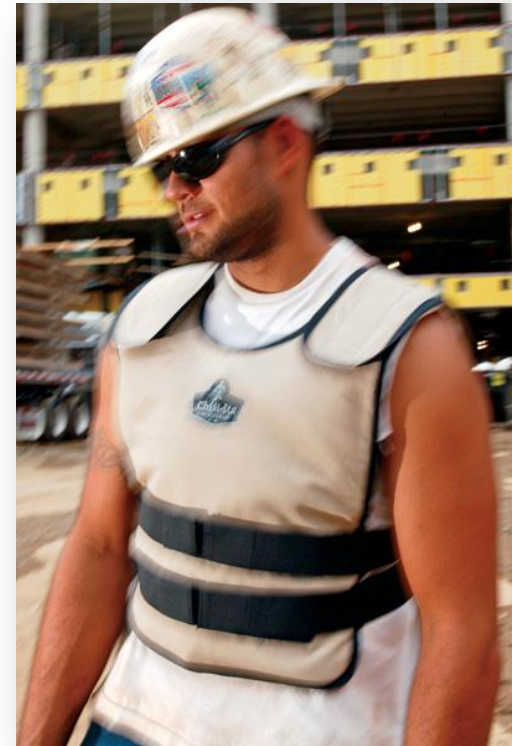
EVAPORATIVE

- ▶ **Cooling bandanas, headbands, triangle hats, and hard hat inserts keep you cool using an evaporative cooling process that is simple and keeps cool comfort on tap for hours.**
- ▶ **Placing an evaporative in the proper area (on large blood vessels near the surface of the skin) cools the body fast.**
- ▶ **Options:**
 - Neck
 - Groin
 - Under Arms



PHASE CHANGE COOLING

- ▶ Utilizes substances that maintain a constant temperature for an extended period of time regardless of outside environment.
- ▶ Typically work for longer periods of time without re-charge.



KEY TAKE-AWAYS

▶ Get Informed

- Be able to recognize symptoms of heat related illnesses, take them seriously, and respond quickly – no one is superhuman.

▶ Be Aware

- Body needs time to adjust to sudden abnormally high temperatures or extreme conditions; even employees previously fully acclimatized are at risk.

▶ Take Action

- Supervisors/employees watch each other closely, provide feedback, work in buddy system, implement heat stress controls, designate person to monitor employees conditions, account

REMEMBER:

**Heat-Related Illness and Death
are 100% Preventable**



Q&A

- ▶ For more heat stress resources and information, please contact Adria Ensrud at 651-642-5868 or adria.ensrud@ergodyne.com
- ▶ For more information on where to purchase heat stress PPE and hydration solutions, go to www.ergodyne.com and www.sqwincher.com
- ▶ For heat stress training, be sure to visit www.clmi-training.com

