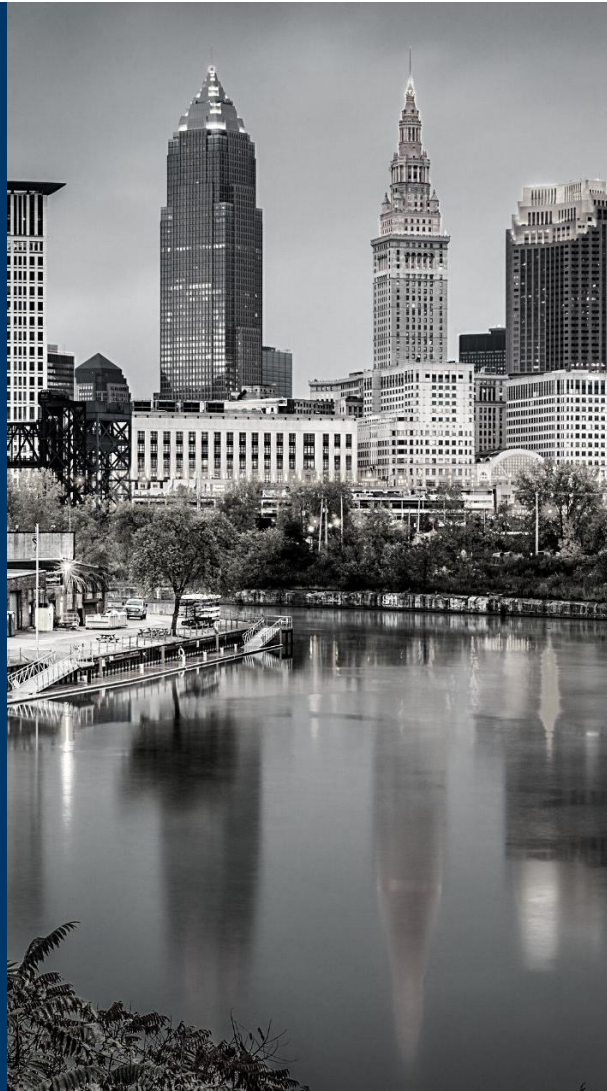




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# BRINGING THE HEAT: OUTDOOR AND INDOOR HEAT-RELATED HAZARDS

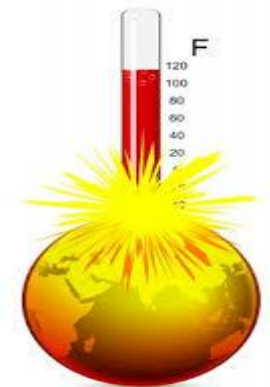
*Ashtabula County Safety Council-July 11, 2024*

# OUTDOOR AND INDOOR HEAT RELATED HAZARDS AGENDA

- APPLICABILITY TO OSHA'S NATIONAL EMPHASIS PROGRAM (NEP) ON HEAT RELATED ILLNESSES
- ASSESSING THE WORKPLACE
- HEAT RELATED ILLNESS-OUTDOOR AND INDOOR
- SITUATIONAL AWARENESS OF SYMPTOMS OF HEAT RELATED ILLNESSES
- OSHA-NIOSH HEAT SAFETY TOOL APP
- HEAT RELATED INSPECTIONS
- BUILDING A BETTER PROGRAM
- TRAINING
- ACTION ITEMS FOR AFFECTED EMPLOYERS

# WHY IS THE NEP NECESSARY?

- **The danger of extreme heat increases each year, 18 of the last 19 summers were the hottest on record.**
- **There are over 3,500 injuries and illnesses related to heat each year.**
- **Low-wage workers disproportionately make up the population of employees exposed to high levels of heat.**

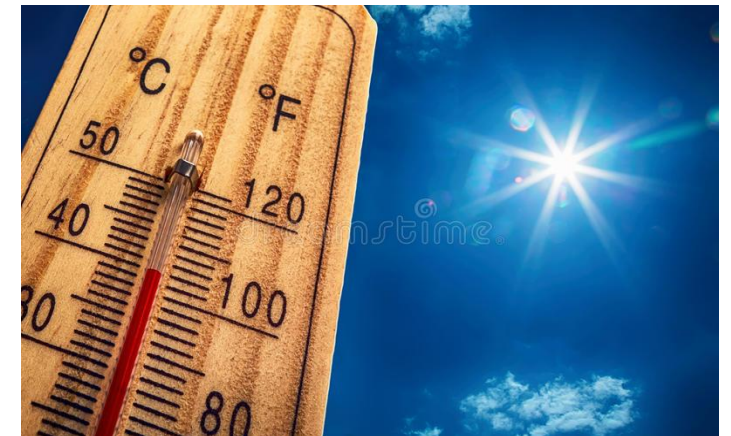


# NEP APPLICABILITY

- **In addition to the 70 targeted Industries, OSHA will also inspect any alleged heat-related fatality/catastrophe, complaint or referral regardless of whether the worksite falls within a targeted industry.**
- **States that have their own OSHA programs are strongly encouraged adopt Federal rules but can make them more stringent.**
- **3<sup>rd</sup> party contractor requirements.**
- **Indoor heat related illnesses & Injuries can occur no matter what the heat index is (foundries, iron & steel mills).**

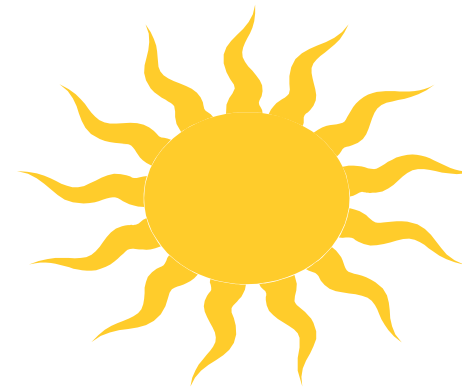
# STEP 1: ASSESSING THE WORKPLACE

- **Ambient temperature is not the only factor raising body temperature of your workers.**
- **NOTE: when the body reaches 104 degrees F for as little as 30 minutes, cellular brain damage or even death can occur!**
- **So, before the Heat Index reaches 80 degrees F, need to assess these factors which could lead to Heat Stress:**
  - **Environmental Factors**
  - **Personal Factors**



# STEP 2: ENVIRONMENTAL HEAT STRESS FACTORS

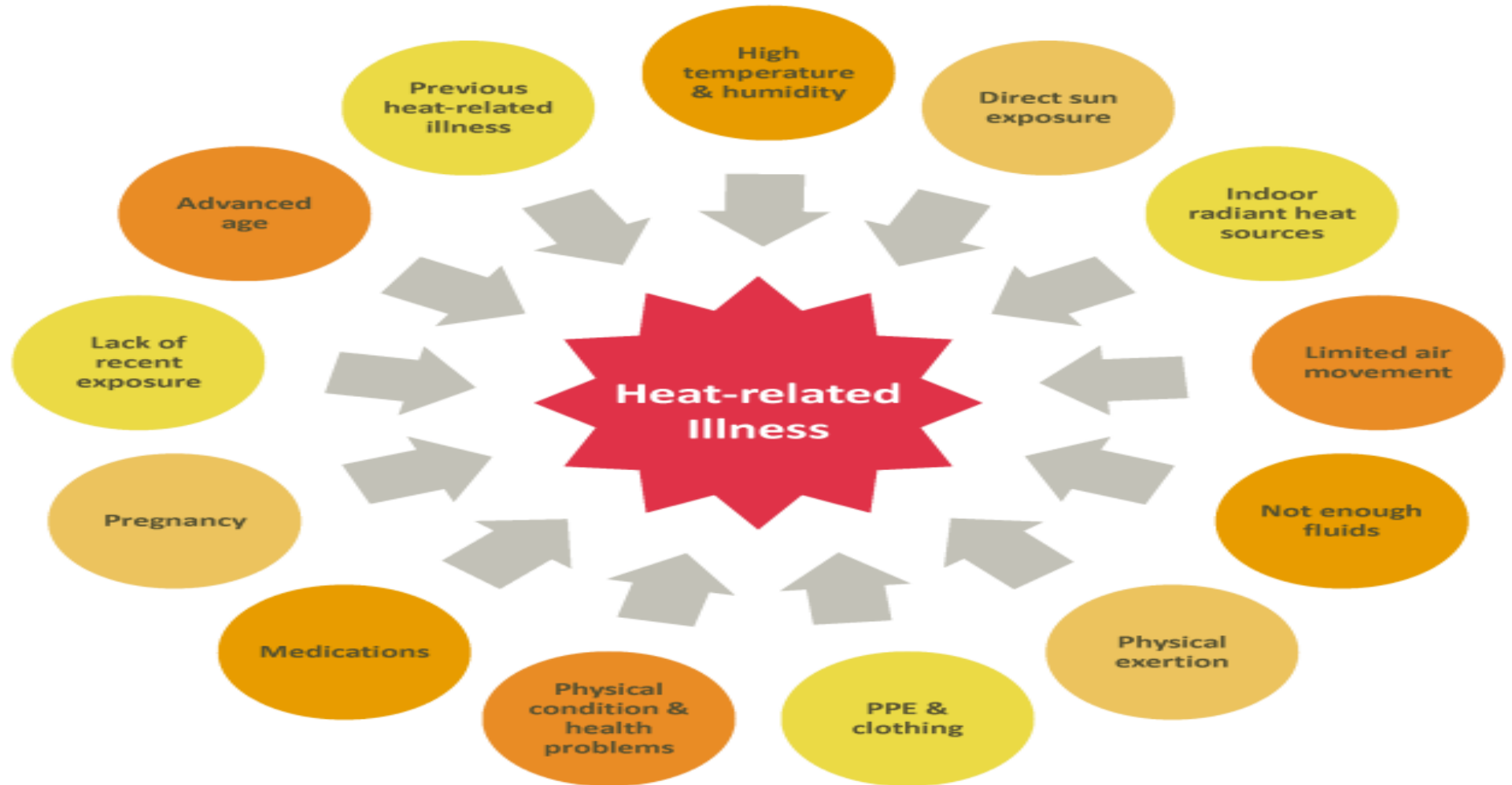
- High ambient temperature +
- Humidity = **Heat Index**
- Direct Sunlight/ Amount of Shade
- Type of Workload (strenuous/heavy/ light duty?)
- Limited air movement/ ventilation
- Hot equipment adding heat
- Reflected Heat
- Does job safety require hot protective clothing and/or PPE?



# HEAT INDEX

HEAT INDEX	RISK LEVEL	PROTECTIVE MEASURES
Less than 91 F	Lower (Caution)	Basic Heat Safety and Planning
91 to 103 F	Moderate	Implement precautions and heighten awareness
103 to 115 F	High	Additional Precautions to protect workers
Greater than 115 F	Very High to Extreme	Triggers even more aggressive protective measures

# EXAMPLES OF HEAT RISK FACTORS





# CONTRIBUTING FACTORS TO HEAT RELATED ILLNESSES

- History of heart disease or diabetes
- Chronic respiratory diseases
- Age factor – elderly or very young children
- **Not acclimated to heat conditions**
- Low level of physical fitness
- Obesity
- Lack of restorative sleep
- Current respiratory infection
- Extensive skin conditions

# CONTRIBUTING FACTORS TO HEAT RELATED ILLNESSES

- **Dehydration\***
  - Intestinal illnesses
  - Decreased sodium intake
  - High caffeine or sugar intake
  - Alcohol consumption
  - Use of contraindicated prescription or over the counter (otc) medications
  - Use of illegal substances
  - Language or other communication barriers
- \* Workers cannot wait until they are thirsty to drink water. Signs of dehydration – thirst; concentrated urine output**

# STEP 3: PERSONAL HEAT STRESS FACTORS

- Lack of physical fitness
- Obesity
- High Blood Pressure
- Chronic/ Heart Disease
- Dehydration/ Diuretic medications
- Sunburn
- Infection
- Lack of acclimatization



# PERSONAL STRESS FACTORS

- The body burns calories and produces heat to maintain the 98.6 Fahrenheit temperature.

Two effective ways the body rids itself of heat are:

- Sweating-Sweat evaporating from skin cools the body
- Dilation of blood vessels-Blood is brought to the skin surface to release heat.



# PERSONAL STRESS FACTORS-WARNING SIGNS

- Problems develop when the body's cooling mechanisms aren't able to work properly, such as when:
- Air temperature exceeds body temperature - the body cannot easily cool itself
- Air is humid - sweat doesn't evaporate quickly
- Sweat doesn't evaporate easily from a person who works/exercises hard while wrapped in heavy clothing or protective gear

# HOW TO RECOGNIZE HEAT RELATED ILLNESSES

- **HEAT STROKE**— Heat stroke is the most serious heat-related disorder. It occurs when the body becomes unable to control its temperature: the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. Heat stroke can cause death or permanent disability if emergency treatment is not given.

- **Symptoms-**

- Hot, dry skin or profuse sweating
- Hallucinations
- Chills
- Throbbing headache
- High body temperature
- Confusion/dizziness
- Slurred speech



# HOW TO RECOGNIZE HEAT RELATED ILLNESSES

- **HEAT EXHAUSTION**-Heat exhaustion is the body's response to an excessive loss of the water and salt, usually through excessive sweating. Workers most prone to heat exhaustion are those that are elderly, have high blood pressure, and those working in a hot environment.
- **SYMPTOMS**
  - Heavy sweating
  - Extreme weakness or fatigue
  - Dizziness, confusion
  - Nausea
  - Clammy, moist skin
  - Pale or flushed complexion
  - Muscle cramps
  - Slightly elevated body temperature
  - Fast and shallow breathing



# HOW TO RECOGNIZE HEAT RELATED ILLNESSES

- **HEAT SYNCOPE-** Heat syncope is a fainting (syncope) episode or dizziness that usually occurs with prolonged standing or sudden rising from a sitting or lying position. Factors that may contribute to heat syncope include dehydration and lack of acclimatization.
- Symptoms
  - Light-headedness
  - Dizziness
  - Fainting





# HOW TO RECOGNIZE HEAT RELATED ILLNESSES

- **HEAT CRAMPS**-Heat cramps usually affect workers who sweat a lot during strenuous activity. This sweating depletes the body's salt and moisture levels. Low salt levels in muscles causes painful cramps. Heat cramps may also be a symptom of heat exhaustion.
- Symptoms
  - Muscle pain or spasms usually in the abdomen, arms, or legs.



# HOW TO RECOGNIZE HEAT RELATED ILLNESSES

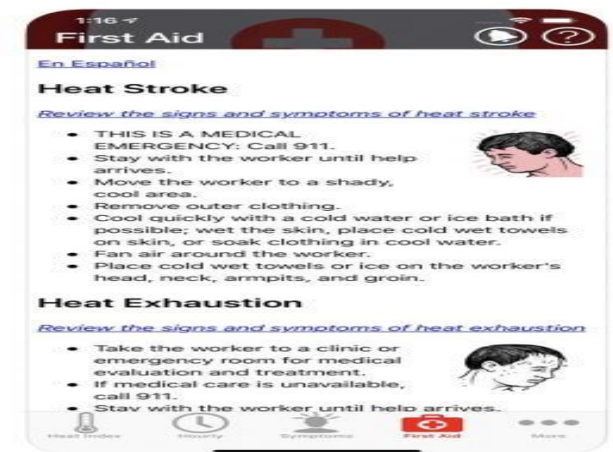
- **HEAT RASH-** Heat rash is a skin irritation caused by excessive sweating during hot, humid weather.
- **Symptoms**
  - Heat rash looks like a red cluster of pimples or small blisters.
  - It is more likely to occur on the neck and upper chest, in the groin, under the breasts, and in elbow creases.



# OSHA-NIOSH HEAT SAFETY TOOL APP

- CONSIDERATIONS WHEN USING THE 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). However, 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.



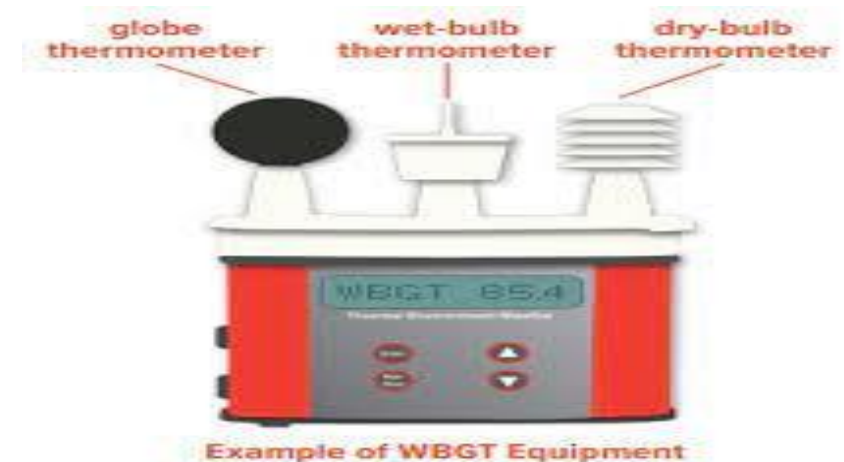
# OSHA-NIOSH SAFETY TOOL APP

- ADDITIONAL CONSIDERATIONS WHEN USING THE APP:
  - 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.



# WET BULB GLOBE TEMPERATURE (WBGT) INDEX

- WBGT is a number that is calculated as a combination of humidity, radiant, and ambient temperature readings.
- This number is then combined with work load to determine heat stress potential.
- The following table displays the recommended work/rest regimen for corresponding WBGT values



# WORK REST REGIMEN TABLE

- The following table displays the recommended work/rest regimen for corresponding WBGT values:

WORK/REST REGIMEN	WORK LOAD*:LIGHT	WORK LOAD*: MEDIUM	WORK LOAD*: HEAVY
Continuous Work	30 C (86 F)	26.7 C (80 F)	25.0 C(77 F)
75% Work,25% rest, each hour	30.6 C(87 F)	28.0 C (82 F)	25.9 C (78 F)
50% Work, 50% rest, each hour	31.4 C(89 F)	29.4 C(85 F)	27.9 C(82 F)
25% Work, 75% rest, each hour	32.2 C(90 F)	31.1 C(88 F)	30.0C (86 F)

\*Values are in °C and °F, WBGT (Wet Bulb Globe Temperature).

# WORK/REST REGIMEN

- PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT VALUES (TLV)
- These TLV's are based on the assumption that nearly all acclimatized, fully clothed workers with adequate water and salt intake should be able to function effectively under the given working conditions without exceeding a deep body temperature of 38°C (100.4° F). They are also based on the assumption that the WBGT of the resting place is the same or very close to that of the workplace. Where the WBGT of the work area is different from that of the rest area, a time-weighted average should be used [consult the *ACGIH 1992-1993 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices (1992)*].
- These TLV's apply to physically fit and acclimatized individuals wearing light summer clothing.

# STEP 4: HEAT RELATED INSPECTIONS

- INCREASED PROACTIVE OSHA INSPECTIONS DUE TO:
  - INDUSTRY CODE IS AMONG THOSE CITED IN THE NEP
  - WORKER COMPLAINT
  - HEAT -STRESS RELATED ILLNESS/INJURY
- ON-SITE CONSULTATION VISITS
- PROGRAMMED ENFORCEMENTS





# CITATIONS FOR HEAT STRESS

- Heat Stress hazards are cited under the General Duty Clause Section 5(a)(1) of the Occupational Safety and Health Act
- GENERAL DUTY CLAUSE:
  - Each employer will furnish to each of his employee's conditions of employment **and** a place of employment that are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.



# CITATIONS FOR HEAT STRESS-GENERAL DUTY CLAUSE

- The employer failed to keep the workplace free of a hazard to which employees of that employer were exposed ***and:***
  - The hazard was recognized in the industry;
  - The hazard was causing or likely to cause death or serious physical harm; ***and***
  - There was a feasible and useful method to correct the hazard.

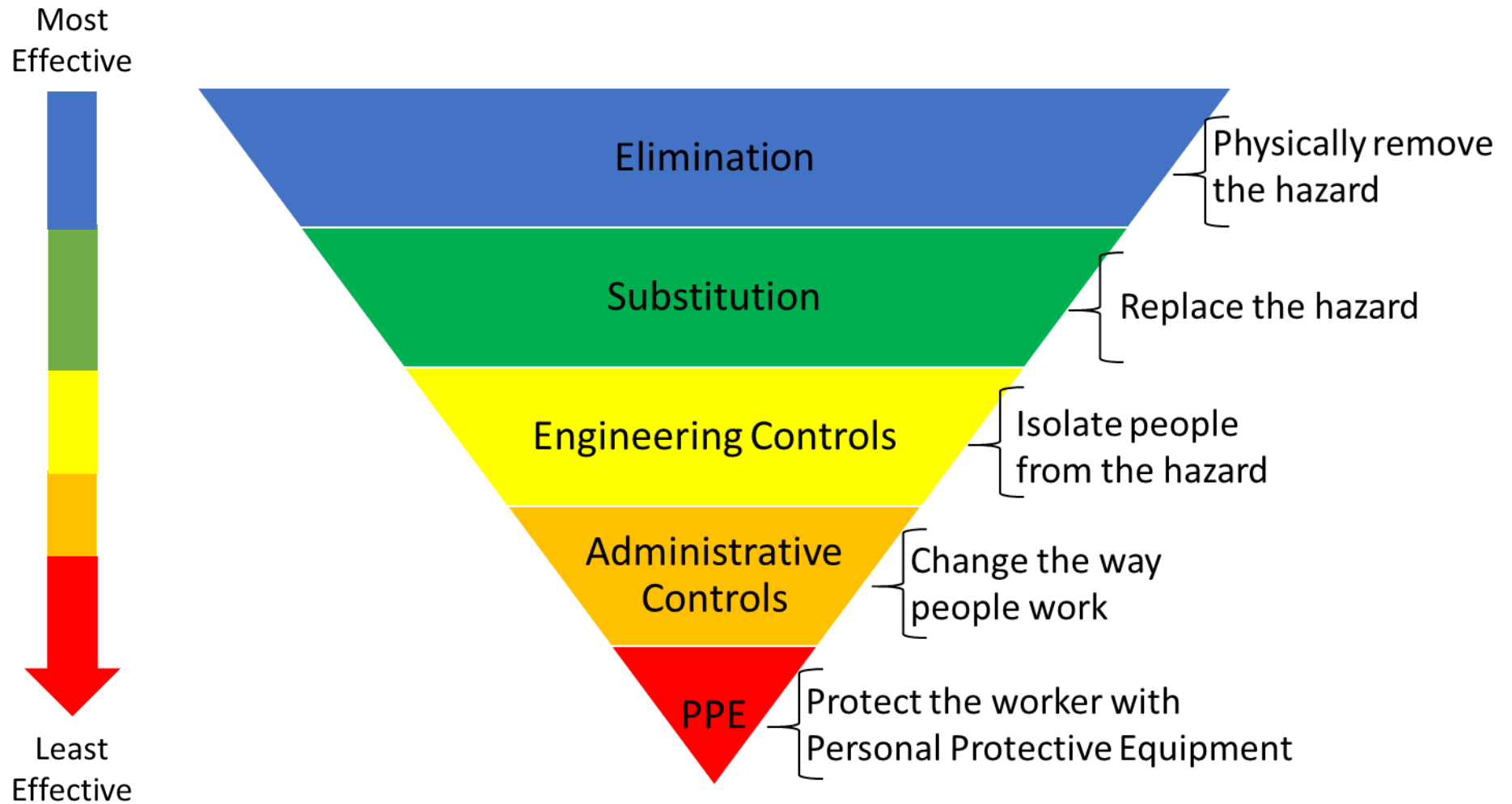
# CITATIONS FOR HEAT STRESS

- **The most common violations that lead to penalties from the NEP are not meeting the requirements of:**
  - **break time,**
  - **hydration management,**
  - **shade,**
  - **temperatures**
  - **failing to maintain a heat illness and injury prevention program;**
  - **not properly documenting conditions in the workplace.**
- **OSHA issued a \$24,000 fine for an employer's lack of heat related first aid training on an environmental restoration firm whose worker died of heat exposure in Florida 01/19/2022**

# STEP 5: DEVELOP A HEAT RELATED ILLNESSES (HEAT STRESS) WRITTEN PROGRAM

- What changes to normal work practices will be implemented when the heat index reaches 80 degrees, 90 degrees, 100 degrees F, when Heat Alerts are announced by the National Weather Service, or Heat Waves by the local weather?
- These need to be stated in the written program (in this order):
  - **Engineering Controls**
  - **Administrative Controls**
  - **Heat-reducing PPE**

# HIERARCHY OF CONTROLS



# ENGINEERING CONTROLS FOR HEAT STRESS

- **minimizing/insulating equipment heat sources,**
- **providing shade (umbrellas, canopies or temporary tents**
- **cooling structures,**
- **providing shaded rest areas with cool water stations.**

# ENGINEERING CONTROLS

- General ventilation
- Air treatment
  - Air cooling
  - Air conditioning
- Local air cooling
- Convection
- Heat conduction
  
- Radiant heat sources
  - Shielding
  - Insulation and surface modification



# ADMINISTRATIVE CONTROLS FOR HEAT STRESS

- Heat Illness prevention program
- Heat acclimatization program
- as the heat index rises, the work/rest ratio must also be adjusted;
- train on how to recognize signs of heat stress in yourself or your co-workers (consider the “buddy system”)
- when/where /how to take rest breaks and stay hydrated.



# ADMINISTRATIVE CONTROLS (WORK PRACTICE)

- Perform work activities during cooler periods of the day
- Minimize activity in hot area
- Slow down the work pace
- Reduce the number and duration of exposures
- Provide recovery areas
- Work rate
  - The fastest way to decrease the rate of heat production is to decrease the work rate.

# PERSONAL PROTECTIVE EQUIPMENT FOR HEAT STRESS

- **Heat-reducing PPE:–**

- consider cooling vests,
- lighter work attire options,
- absorptive cooling PPE, and
- don't forget the sunscreen for outside work.

# PERSONAL PROTECTIVE EQUIPMENT

- Reflective clothing
- Auxiliary body cooling
  - Ice vests
  - Wetted clothing (low humidity)
  - Water-cooled garments (hoods, vests and “long johns”)
  - Circulating air (vortex tubes, compressed air)



# YOUR HEAT STRESS PROGRAM

- **Written Plans should also include:**
  - **Risk Assessment**
    - **How did you assess temperatures and work exertion?**
  - **How do you record weather or heat data?**
  - **Action items for various levels of heat**
    - **ie; Caution (less than 80), Warning (80-94), Danger (95+)**
  - **Specific to the heat related hazards in your environment.**
  - **If indoors, Maps and Signs of high heat zone areas.**
  - **Specific task that are known to cause heat stress.**
  - **Need to be periodically updated or when a change in processes can increase risk.**

# ARE YOU SURE YOUR WRITTEN PROGRAM INCLUDES THESE CRITICAL CONSIDERATIONS?

- Implementing a work/rest regimen based on the following:
  - Anticipated/required work rate and type of work performed
  - Ambient temperature and other environmental factors
  - Type of protective clothing and PPE needed for the job
  - Individual worker characteristics and fitness
- And the five specific things the OSHA Auditor is looking for:
  - Is adequate **water** sources readily available?
  - Are sufficient **rest** periods provided?
  - Is adequate **shade** available?
  - Have **acclimatization** procedure been used for new or returning employees?
  - Has appropriate heat stress avoidance **training** been conducted?

# STEP 6: TRAINING THE WORKFORCE

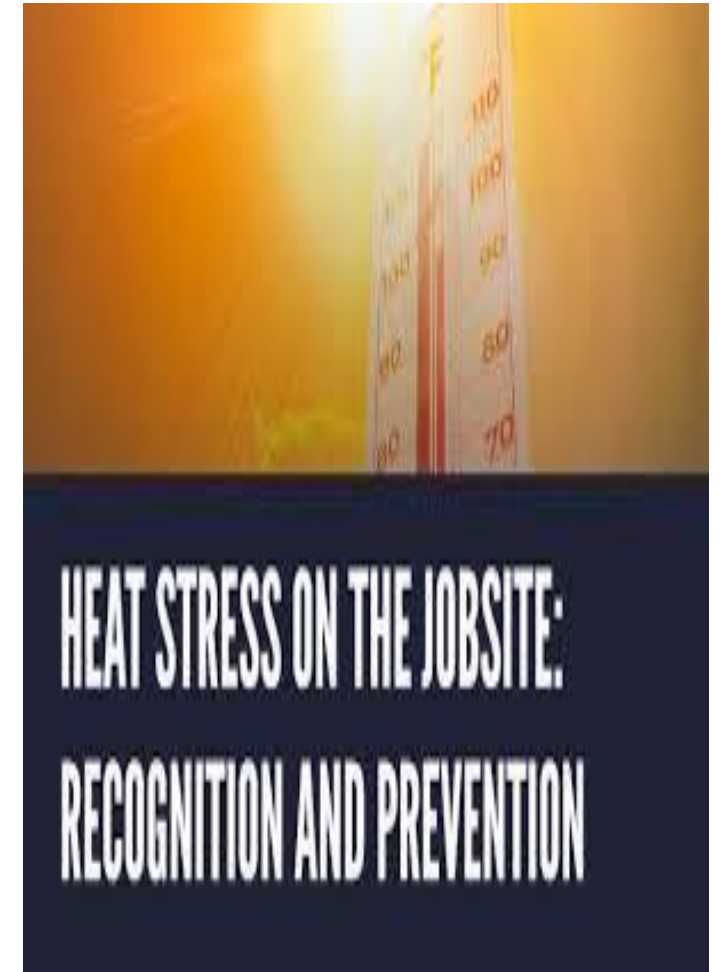
**Once the written program is completed,  
TRAIN...TRAIN...TRAIN**

**(including any temporary hires and summer help!)**

- **Train to your Written Program**
- **Include how to recognize Heat Stress symptoms**
- **What actions to take in the event of Heat Stress**
- **What heat-reducing PPE will be used and how to maintain it**

# TRAINING

- Knowledge of hazards
- Predisposing factors (e.g., age, medications)
- Signs and symptoms
- PPE
- First-aid
- Health effects of heat-related illness



# YOUR HEAT STRESS TRAINING

- **Training**
  - **Should mirror your Plan.**
  - **Must be documented, signed by employees.**
  - **Keep good records.**
  - **May require updating if Written Plan is changed.**





# ACTION ITEMS FOR AFFECTED EMPLOYERS

- A heat illness prevention program
- A heat acclimatization program
- Access to an adequate supply of potable water
- Means for employees to cool off (e.g., shaded areas, air-conditioned rooms, vehicles, fans)
- Adequate number of rest periods
- Appropriate protective clothing such as cooling vests
- Heat stress training
- First aid training (e.g., recognition, treatment of heat illnesses)

**WATER. REST. SHADE.**

*The work can't get done without them.*

# WORK MONITORING PROGRAMS

- **Personal monitoring**
  - Heart rate
  - Recovery heart rate
  - Oral temperature
  - Extent of body water loss



# HEAT STRESS RESOURCES

- <https://www.osha.gov/heat>
- <https://www.osha.gov/otm/section-3-health-hazards/chapter-4>
- <https://www.cdc.gov/niosh/topics/heatstress/default.html>
- <https://www.dhs.gov/publication/heat-stress-resources>
- <https://www.epa.gov/climate-indicators/heat-related-illnesses>
- <https://safetyequipment.org/heatstress/>
- <https://www.ehstoday.com/health/article/21246507/10-key-elements-for-a-workplace-heat-safety-program>
- <https://www.hhs.gov/climate-change-health-equity-environmental-justice/climate-change-health-equity/climate-health-outlook/extreme-heat/index.html>



# QUESTIONS?

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