



# Reducing the Risk of Heat Stress in the Season Ahead

May 21, 2020



## Disclaimer

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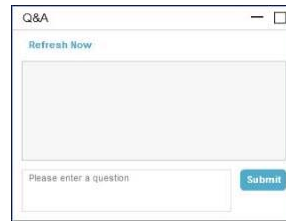
## Interactive Session: Your Features Today



(May improve viewing/audio)



(Full screen viewing option)



Your questions/comments



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## Today's Learning Event Facilitator

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## Summary

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Heat stress occurs when a body cannot eliminate excess heat. Exposure to excessive heat can cause various symptoms including confusion, dizziness, fatigue, cramps, and nausea, and could lead to illnesses such as heat exhaustion or heat stroke. This session will review tools and techniques for monitoring the environment and assessing the potential for heat related illness. We will describe methods to reduce levels of heat stress through engineering controls and administrative management. Assessment of heat exposure and development of heat stress controls can be incorporated into a heat related illness prevention program.



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## Joining Today's Session...

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- Are employees in your work environments in danger of heat stress?
- Do they understand how to recognize heat strain or heat illness?
- Have best practices been established?
- Are your resources effective on the issue?

*We welcome your chat: Your industry and position*



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## Session Objectives

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1. Overview of Heat Stress and Effects
2. Resources for Prevention
3. Assessing the Exposure – Five Steps You Can Take Today
4. Management Controls and Resources
5. Quiz



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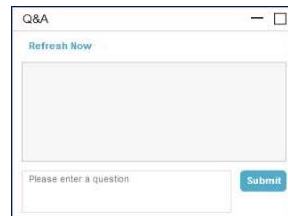
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## Your Reason for Participating Today?

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Need to know issues for you?

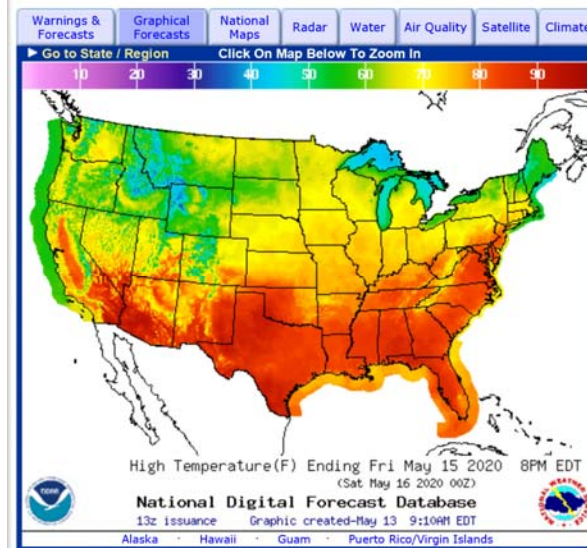


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## US Temperature for May 15, 2020



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## What Will You Learn Today About Heat Stress

**Risk and Consequences:** Heat exposure can be deadly. Uncontrolled exposure can lead to injury and illness. Workers experiencing **effects** of heat stress are **less alert and at greater risk for accidents**.

**Hazard Recognition and Effects of Heat Stress:** Sunny, cloudy, hot, dry, humid, newly employed, outdoors/indoors...these can all contribute to heat illnesses. Rash, cramps, exhaustion, heat stroke...these medical conditions are effects of heat stress that require action.

**Proper Response:** Educate, inform, develop and implement the plan, follow procedures, audit, take action and get help.

**Resources:** Use the PMA, OSHA, NIOSH, CDC, ACGIH resources.

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## The Story of the Restaurant Worker...

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Michigan OSHA: [http://www.oem.msu.edu/MIFACE\\_Constr\\_Div/Case277.pdf](http://www.oem.msu.edu/MIFACE_Constr_Div/Case277.pdf)



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## The Story of the Construction Worker...

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Cause of death: Heat Stroke <http://www.cdc.gov/niosh/face/stateface/ky/03ky053.html>



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## What is Heat Stress?

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**Heat Stress** is caused by exposure to heat due to work load (metabolic heat) and/or exposure to heat from the work environment.

**Heat Strain** – this is the physiological response due to the heat stress.

**Acclimatization** – physical adaption and improved ability to handle heat stress.



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## What is Heat Stress?

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**There are many contributing factors to heat stress:**

**Personal factors** – age, weight, fitness, degree of acclimatization, metabolism, alcohol/drug use, medical conditions, clothing, prior heat injury/sensitivity.

**Environmental factors** – air temperature, sunlight, relative humidity, radiant heat, air movement, conduction, convection, evaporation rate.



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## Heat Disorders and Health Effects

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- **Heat Stroke**
- **Heat Exhaustion**
- **Heat Cramps**
- **Heat Collapse**
- **Heat Rashes**
- **Heat Fatigue**



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## Heat Disorders and Health Effects

**Heat Stroke** – uncontrolled body temperatures (>105 °F). Hot, dry skin. Medical emergency. Confused, irrational, convulsions, unconscious. Caused by excessive work and heat loads. Highly variable and difficult to predict. Deadly.

Response Actions: call 911 “immediately”, shade, remove outer clothing, no liquids/food. Never leave unattended or send home alone. Wet the skin and fan to increase evaporative cooling. Wait for medical professionals.

**Heat Exhaustion** – headache, nausea, vertigo, weak, thirsty, giddiness. Responds quickly to prompt treatment. Watch for fainting. Water, rest, shade. Seek medical attention. Can progress to Heat Stroke unexpectedly!



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## Heat Disorders and Health Effects

**Heat Cramps** – muscle cramps, aches. Due to excessive sweating-loss of water or salt, electrolyte imbalance. Shade, water, rest. Seek medical attention.

**Heat Collapse** – Fainting. Brain not receiving oxygen due to blood pooling in extremities. Person may faint. It's rapid and unpredictable. Acclimatization can prevent this disorder. Seek medical treatment. Water, rest, shade.

**Heat Rashes/Prickly Heat** – Very common. Red papules under restrictive clothing due to “unevaporated” sweat remaining on skin. Can become infected if not treated. Will often disappear when sweat is removed from skin and cool off period.

**Heat Fatigue** – impaired abilities, motor skills and mental focus. Acclimatization and training for hot work environments should prevent this condition.



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## Pause for Questions

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## NOAA National Weather Service, Weather Ready Nation

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### National Weather Service – Heat Safety

<http://www.nws.noaa.gov/om/heat/index.shtml>

### Weather Ready Nation (WRN) – Weather Safety

<http://www.nws.noaa.gov/com/weatherreadynation/#.VNjkRi6ULGw>



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## OSHA Heat Illness Prevention Campaign

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**Water. Rest. Shade.** The work can't get done without them.

- OSHA Training Video:  
<https://www.youtube.com/watch?v=Kr2ouLj1oW0>



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## Getting Acclimated

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**Acclimation** – this is a gradual physiological adaptation that improves a person's ability to tolerate heat stress (aka. acclimitization).

**Physical Activity** – activity (stress, heat load) similar to expected conditions are required to acclimate.

**How to acclimate** – 2+ continuous hours in heat for 5 of last 7 days or 10 of 14 days, the worker is considered acclimatized (ACGIH TLV).

**Loss of acclimation** – when work activity under stress conditions stops. Four consecutive days can lead to significant loss. 3-4 weeks may be total loss of acclimatization.

**Clothing** – must consider. It can prevent evaporative and convective cooling. Air and water vapor movement away from skin is important feature. Firemen, restaurant workers, construction, law enforcement, agricultural workers.



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## Terms to be Familiar With...

**Heat** – measure of energy in terms of quantity. **Calorie** – amount of heat to raise 1 gram of water 1 °C.

**Metabolic Heat** – this is the heat generated by body activity.

**Conduction** – heat transferred between two objects in contact (sit on cold bench). Heat always travels from warmer surface to colder.

**Convection** – heat transfer in moving fluid. Air flowing over skin, if air is cooler than body. Air >95 °F will warm the body!

**Evaporative Cooling** – sweat evaporates off skin. Body heat is used to **evaporate** (liquid to vapor) the sweat. Cooling sensation. High humidity can reduce evaporative mechanism (good in Arizona, poor in New Orleans).

**Radiation** – transfer of heat energy through space. If worker's body is warmer than air, heat will transfer from worker to air. Hot surfaces and infrared light can heat the worker.



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## CDC Guidance

### Heat Exhaustion

- Heavy sweating
- Weakness
- Cold, pale, and clammy skin
- Fast, weak pulse
- Nausea or vomiting
- Fainting



### What You Should Do:

- Move to a cooler location.
- Lie down and loosen your clothing.
- Apply cool, wet cloths to as much of your body as possible.
- Sip water.
- If you have vomited and it continues, seek medical attention immediately.

### Heat Stroke

- High body temperature (above 103°F)\*
- Hot, red, dry or moist skin
- Rapid and strong pulse
- Possible unconsciousness



### What You Should Do:

- Call 911 immediately — **this is a medical emergency.**
- Move the person to a cooler environment.
- Reduce the person's body temperature with cool cloths or even a bath.
- Do **NOT** give fluids.



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## Session Objectives

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1. Overview of Heat Stress and Effects
- 2. Resources for Prevention**
3. Assessing the Exposure
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## Recommended Resources

1. **OSHA:** Occupational Heat Exposure Tools, Smart Phone Apps, Heat Illness Prevention Training Guide, Campaign to Prevent Heat Illness in Outdoor Workers
2. **CDC:** Media Toolkit, Extreme Heat and Your Health
3. **NIOSH:** Heat Stress and Keeping Workers Hydrated and Cool Despite the Heat (NIOSH Science Blog)
4. **US Navy:** Heat Stress
5. **Today's Presentation**



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## Recommended Links

**Media Toolkit** <http://www.cdc.gov/extremeheat/materials.html>

**OSHA Occupational Heat Exposure** <https://www.osha.gov/SLTC/heatstress/index.html>

**OSHA Heat Stress Phone Apps (Android and iPhone)**

[https://www.osha.gov/SLTC/heatillness/heat\\_index/heat\\_app.html](https://www.osha.gov/SLTC/heatillness/heat_index/heat_app.html)

**OSHA's Campaign to Prevent Heat Illness in Outdoor Workers**

<https://www.osha.gov/SLTC/heatillness/index.html>

**OSHA Heat Illness Prevention Guide**

[https://www.osha.gov/SLTC/heatillness/osha\\_heattraining\\_guide\\_0411.pdf](https://www.osha.gov/SLTC/heatillness/osha_heattraining_guide_0411.pdf)

**NIOSH Heat Stress** <http://www.cdc.gov/niosh/topics/heatstress/>

**CDC: Extreme Heat and Your Health** <http://www.cdc.gov/extremeheat/warning.html>



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## Resources for Managing Heat Stress

**OSHA Occupational Heat Exposure and The Campaign to Prevent Heat Illness in Outdoor Workers**

<https://www.osha.gov/SLTC/heatstress/index.html>

**OSHA Heat Stress Phone Apps (Android and iPhone)**

[https://www.osha.gov/SLTC/heatillness/heat\\_index/heat\\_app.html](https://www.osha.gov/SLTC/heatillness/heat_index/heat_app.html)

**OSHA Heat Illness Prevention Guide**

[https://www.osha.gov/SLTC/heatillness/osha\\_heattraining\\_guide\\_0411.pdf](https://www.osha.gov/SLTC/heatillness/osha_heattraining_guide_0411.pdf)

**CDC Media Toolkit**

<http://www.cdc.gov/extremeheat/materials.html>

**CDC: Extreme Heat and Your Health**

<http://www.cdc.gov/extremeheat/warning.html>

**NIOSH Heat Stress**

<http://www.cdc.gov/niosh/topics/heatstress/>

**US Navy: Heat Stress**

[http://www.cnic.navy.mil/regions/cnrma/om/safety/heat\\_stress.html](http://www.cnic.navy.mil/regions/cnrma/om/safety/heat_stress.html)



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## Heat Stress in Your Workplace?

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- Hazard Assessment
- Employee Complaints
- Accident Investigations
- Weather Conditions
- New Employees
- Older Employees
- New Job Activity
- Roof Work
- Water, Rest, Shade
- Evaluate and Check In



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## Exposure Assessment

- **Hazard Assessment** – document **work activity**, the **environment**, employee **response/effects**, anticipate **changes** in work flow, **review** with staff and **update** as needed.
- **Work Activity** – is it strenuous? Resting or light activity, moderate or heavy work. What's involved, are they acclimated, trained to respond?
- **Environment** – where are we working and what may impact us? Sunlight, high humidity, radiant heat (furnace/engine/ovens), steam, heat wave.
- **Inspection Checklist** – having a checklist can save time and provides good documentation. Let's look at one example:  
[https://www.osha.gov/SLTC/heatillness/heat\\_index/employer\\_checklist.html](https://www.osha.gov/SLTC/heatillness/heat_index/employer_checklist.html)
- **Measurements** – wet bulb globe temperature (WBGT). Industrial hygiene measurements can quantify the "heat index". Should be taken by a qualified industrial hygienist. Measurements can be a vital part of assessing hazard.  
[https://www.osha.gov/SLTC/heatillness/heat\\_index/pdfs/all\\_in\\_one.pdf](https://www.osha.gov/SLTC/heatillness/heat_index/pdfs/all_in_one.pdf)



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## Exposure Assessment – Internal

### Five steps you can take – starting today

1. Review past events or claims. Have there been any?
2. Past employee or supervisory inquiries/complaints?
3. Business units where you think the exposure may exist?
4. New operations where you think there may be an exposure?
5. Send reference materials (technical bulletin) to your operations/supervisory personnel.

**Responding to Heat Illness** – remember, risk and severity of heat illness will vary among people. A good program will **anticipate and control** these varied responses. Now we review Management Controls.



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## Heat Stress Monitoring



TSI/Quest Heat Stress Monitor



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## Pause for Questions



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## Water, Rest, Shade

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**Drink Water, Rest in the Shade.**



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## Water, Rest, Shade

### Drink **W**ater, **R**est in the **S**hade.

**Drinking water** often (20 minutes), even when not thirsty. Prevents strain and reduces strain.

**Rest** in the Shade to cool down. Remove the employee from the hazard.

**Safe areas** for employees – create a cooling off area. Recognition, anticipation and control – management objectives.

**NEVER** – never ignore signs or symptoms (fatigue, dizzy, confused, heart rate increase, profuse sweat, chills)...get medical help, water rest shade.

**Employee Education** – train and warn employees. Encourage teamwork to watch out for each other and get help.

**Resources** – let's look at some tools you can use right now...



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## Management Controls

**Heat Stress Management Program** – use the tools to implement or expand your existing program. Go to the Resources slide and access tools. PMA Risk Control is available to help you or your staff select and develop a program.  
[https://www.osha.gov/SLTC/heatillness/osha\\_heattraining\\_guide\\_0411.pdf](https://www.osha.gov/SLTC/heatillness/osha_heattraining_guide_0411.pdf)

**Educating Your Workforce** – Share information. Put your program into daily use and monitor effectiveness. Beat the heat, start today.

**Return to Work/Acclimatization** – make sure employees remain acclimated (injury, vacation, changes in work, environment, health (heat wave!).

**Pre-placement Medical Screening** – identify susceptible workers. Know who is taking medications, restrictive diets, anything that may put them in danger of heat disorder. Here is a resource for this valuable management control:  
[https://www.osha.gov/SLTC/heatillness/heat\\_index/monitoring\\_workers.html](https://www.osha.gov/SLTC/heatillness/heat_index/monitoring_workers.html)

**At Risk Behaviors** – recreation during breaks, sports, alcohol, drug use, poor health, smoking. Seek HR or legal advice when warranted.



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## Management Controls

**Heat Stress Management Program** – use the tools to implement or expand your existing program.

- Go to the Resources slide and access tools.
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[https://www.osha.gov/SLTC/heatillness/osha\\_heattraining\\_guide\\_041\\_1.pdf](https://www.osha.gov/SLTC/heatillness/osha_heattraining_guide_041_1.pdf)

**Educating Your Workforce** – Share information. Put your program into daily use and monitor effectiveness. Beat the heat, start today.



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## Control and Prevention of Heat Stress

**Engineering Controls** – lower work loads (reduce metabolic rate), air movement, A/C, reduce process heat, water vapor/steam leaks, shield radiant heat sources.

**Administrative Controls** – limit exposure time, allow recovery times, limit physical strain, heaviest work in early/coolest time of day, emergency action plan for immediate response when heat illness is suspected.

**Personal Protective Equipment** – cooling vests, clothing that liberates heat and water vapor, powered air purifying respirators (PAPRs), vortex tubes with compressed air, reflective clothing.

**Additional Resources for Controls and Prevention** from OSHA and others

<https://www.osha.gov/SLTC/heatstress/prevention.html>  
<http://www.cdc.gov/niosh/docs/2011-174/pdfs/2011-174.pdf>



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## Closing Comments and Discussion



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## Review Our Objectives

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1. Overview of Heat Stress and Effects
2. Resources for Prevention
3. Exposure Assessment
4. Management Controls
5. Quiz



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## Quiz 1-5

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1. Heat Illness can lead to serious illnesses in healthy workers? T/F?
2. Acclimation is the process of adjusting one's ability to tolerate heat exposure? T/F
3. New workers are at greater risk for heat stress if not acclimated properly? T/F
4. Which of the following is NOT a good way to prevent heat exhaustion or heat stroke when working in hot kitchen areas? (check all that apply)
  - drinking plenty of soda during the shift
  - drinking plenty of water during the shift
  - wearing loose cotton clothing
  - using fans, air conditioning and ventilation (heat removal) systems
5. In a kitchen which of the following conditions can workers suffer if exposed to very hot temperatures? (check all that apply)
  - confused  dizzy  heat exhaustion  heat stroke



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## Quiz 6-10

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6. Heat illness can develop after a worker leaves the hot conditions. T/F?
7. Vacation can diminish one's ability to tolerate a hot work environment. T/F
8. Drinking water and taking frequent breaks in air conditioning can prevent heat stress. T/F?
9. A written heat stress prevention program is only needed in extreme work environments. T/F?
10. *Drink, Water and Rest in the Shade* is a good motto for workers to know. T/F?



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## Any Final Issues



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## Upcoming Learning Events

Tips for (Safety) Trainers - #3

June 11, 2020 – 10:30 AM (EDT)

PMA's 2020 Workers' Compensation  
Higher Education Study Results and Tools  
to Address a Leading Loss Driver:  
Sprains & Strains

June 25, 2020 – 10:30 AM (EDT)



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## The Organizational Safety Institute

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**Your Feedback Matters...**

**[rcwebevents@pmagroup.com](mailto:rcwebevents@pmagroup.com)**



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