Environmental Health and Safety
Heat Illness Prevention Program

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Introduction

The Arizona State University Heat Illness Prevention Program is designed to safeguard the well-being of our campus community across multiple ASU locations. ASU Environmental Health and Safety recognizes the increasing challenges posed by extreme temperatures.

This program outlines proactive measures to mitigate the impact of heat-related risks in response to these concerns and needs as a university. EHS aims to ensure the safety of all ASU students, faculty and staff by expanding awareness and preparedness for working in a hot environment.

Refer to the Occupational Safety and Health Administration Quick Card for information on protecting yourself and others from heat stress.

Scope

This program applies to any employee working outdoors for greater than 15 minutes within a 60-minute time frame when the outdoor temperature in the work location meets the following conditions:

- **Arizona**: When the heat index in the work location is at the **extreme caution level** or 90 degrees Fahrenheit and above.
- **California**: When the temperature in the work location is at or above 80 degrees Fahrenheit.
- **Field research**: Refer to the field research section.
- **Other locations**: Follow local, state or country regulations.

Roles and responsibilities

Environmental Health and Safety

EHS is responsible for the following roles regarding heat safety:

- Develop and administer the Heat Illness Prevention Program.
- Incident response and prevention.
- Provide heat safety training and resources.

Departments and supervisors

Departments and supervisors are responsible for the following regarding heat safety:

- Communicate with employees working outside in high heat to ensure they have water and take breaks throughout the day.
- Construct acclimatization schedules with new or returning employees.
- Ensure employees are trained.
- Ensure employees know locations to access potable drinking water on campus.
- Review heat safety protocols with employees.

Employees

Employees are responsible for the following regarding heat safety:

1. Ensure you drink enough water. Follow all high-heat procedure protocols.
2. Complete training annually.
    a. Alert a supervisor if you or a coworker begin to feel ill. Call 911 if necessary.
3. Take breaks as needed.

Best practices and recommendations

Reduction of risk factors

Risk factors are traits or actions that can increase or decrease the likelihood of an employee experiencing heat-related illness when working outdoors. Examples of risk factors that can impact the body's ability to withstand heat include but are not limited to:

- Age
- Alcohol or caffeine intake.
- Clothing.
- Health conditions.
- Water intake.
- Weight
- Workload.

Employees may reduce their likelihood of experiencing heat-related illnesses by considering these factors.

Acclimatization

It can take up to two weeks for the body to fully adjust to working in high temperatures. Acclimatization is a process that helps the body adapt to working in high-temperature environments. Employees should speak to their supervisors if they are new to working outdoors, returning to working outdoors after a break of two or more weeks, new to the area or feel that an acclimatization schedule is necessary.

Communication

Employees should speak with their coworkers regularly to potentially identify anyone suffering from heat-related illnesses when working in the heat. Regular contact with coworkers or supervisors can help identify the early signs and symptoms of heat-related illnesses. Additionally, employees should regularly check in with supervisors while working in the heat to alert them if any employee's condition happens to change.

Rest and shade

Employees are encouraged to do the following:

- Take cool-down breaks when working in the heat to prevent overheating.
- Rest in cool, shaded locations when possible, including refrigerated campus buildings.
- Remove any PPE that could increase their body's temperature for the duration of their break as long as they are safe and not exposed to hazardous conditions.

Supervisors should plan for employees to take more breaks when the heat index is higher. The National Institute for Occupational Safety and Health recommends the following work-rest schedule for employees doing work outdoors:

Work-rest schedule	
Heat index — Fahrenheit	**Rest break interval and duration**
90 or greater	10 minutes every two hours
95 or greater	20 minutes every hour
100 or greater	30 minutes every hour
105 or greater	40 minutes every hour

Employees should be aware of the temperature, follow work or rest schedules and take the appropriate precautions based on the Arizona Department of Health Services' Heat Index Chart, which can also be found in Appendix B of this program.

- **Caution** — 80 degrees Fahrenheit and above:
  - Apply sunscreen or sun protection.
  - Drink water at least every 15 minutes.
  - Recognize the signs and symptoms of heat illnesses.
  - Take cool-down breaks.
  - Wear appropriate clothing for the temperature.
- **Extreme caution** — 91 degrees Fahrenheit and above:
  - Drink about one cup of water every 15-20 minutes.
  - Follow all previous precautions.
  - Protect yourself from sunlight.
  - Take cool-down breaks frequently.
- **Danger** — 103 degrees Fahrenheit and above:
  - Adjust job activities and work schedules to prevent heat-related illnesses.
  - Follow all previous precautions.

Schedule adjustments

Supervisors should adjust start and end times for employees to work before high temperatures set in. Additionally, supervisors should plan for employees to take breaks throughout their shift, be aware of the assigned tasks and consider any other factors that could affect the employees' work and safety.

Water

Water is essential to maintaining hydration levels, regulating body temperature when working in the heat and preventing heat-related illnesses. Employees should follow these guidelines to ensure they stay hydrated in the heat:

- Avoid drinking caffeinated or energy drinks while working outdoors, as these could lead to increased dehydration.
- Begin hydration the night before work and avoid drinking alcohol.
- Drink water at room temperature if you are overheated.
- Drink one cup of water for every 15–20 minutes while working outdoors. Do not drink sports drinks in place of water.
- Employees should plan to bring sufficient water for the time expected to be working if employees are planning to work in locations where access to water is limited.
- Refill water bottles at refill stations, water fountains and any location that provides potable water.

Refer to the Hydration Guidance sheet for questions or more information.

Clothing, PPE and work attire

Clothing impacts how the body experiences heat; certain fabrics can cause the body to retain more heat than others. Employees should dress appropriately based on the work conditions.

Suggested types of clothing for employees working outdoors include the following:

- Cooling equipment such as ice vests and neck shades.
- Head coverings, such as a wide-brimmed hat.
- Lightweight and loose-fitting fabric that increases the airflow and aids in cooling the body.

- Light-colored clothing that reflects heat. Darker-colored clothing will absorb the heat.
- Long-sleeved shirts made of breathable fabric to prevent sunburn.

Certain forms of PPE can also increase the heat burden on an employee's body. Items such as respirators, coveralls, etc., can increase the likelihood of employees experiencing heat-related illnesses by reducing the body's ability to release heat and sweat.

Employees must still wear PPE, such as respirators or coveralls when required. Employees should take breaks to prevent heat illnesses, drink water and speak with supervisors about other ways to stay safe while doing tasks requiring PPE.

Heat-related illnesses

Working in high temperatures may cause someone to experience heat-related illnesses. According to NIOSH, there are six heat-related illnesses that employees and supervisors should be on the lookout for while working outdoors:

Heat stroke

Heat stroke is an illness that occurs when the body cannot control its temperature, causing its temperature to rise rapidly. Your body cannot sweat or cool down during heat stroke, and your internal temperature can increase to 106 degrees Fahrenheit or higher. Heat stroke may result in death or permanent disability. Call 911 immediately, then inform your supervisor.

Signs and symptoms of heat stroke include the following:

- Confusion.
- High body temperature.
- Hot, dry skin or profuse sweating.
- Seizures.
- Slurred speech.

Heat exhaustion

Heat exhaustion is the body's response to an excessive loss of water and salt, typically through sweating. Those at higher risk for heat exhaustion include those with high blood pressure, older adults or those who work in hot environments.

Signs and symptoms of heat exhaustion include the following:

- Decreased urine output.
- Dizziness.
- Elevated body temperature.
- Headache.
- Heavy sweating.
- Irritability.
- Nausea.
- Thirst.
- Weakness.

Heat cramps

Heat cramps are muscle cramps or spasms typically due to excessive sweating and lack of electrolyte replenishment.

Signs and symptoms of heat cramps include the following:

- Muscle cramps.
- Pain or spasms in the abdomen, arms or legs.

Heat rash

Heat rash is a skin irritation caused by excessive sweating. Signs and symptoms of heat rash include the following:

- Irritation often appears on the neck, upper chest, groin, under breasts and in the crease of elbows.
- Red clusters of pimples or small blisters.

Responding to heat-related illness

If employees begin to feel the onset of a heat-related illness while working or observe a fellow employee showing heat-related illness signs, they should take the following steps:

1. Stop working immediately.
2. Call 911.
3. Get the employee to a cool place.
4. Loosen any tight clothing.
5. Apply cool, wet cloths to the skin.
6. Give them cool, not cold, water if the employee is conscious.

Employees should never be left alone while responding to a heat-related medical emergency.

Location-specific requirements

Employees must know and understand location-specific requirements when conditions in the work location exceed the following thresholds:

- **Arizona**: When the temperature at the work location has a heat index rating of **dangerous** on the National Weather Service Heat Index Chart.
- **California**: When temperatures at the work location meet or exceed 95 degrees Fahrenheit.
- **Other locations**: Check local ordinances for outdoor work procedures before starting work.

Arizona

All non-emergency outdoor work will be stopped, and emergency work will be evaluated on a case-by-case basis when high-heat procedures go into effect.

Emergency work that must continue will follow these protocols:

- Check in by radio to a supervisor every 15–30 minutes depending on circumstances.
- Let someone know where you will be working and how long you will be there.
- Take rest breaks in the shade or an air-conditioned space. Refer to the Work Rest table above.
- Work with a partner if possible. Let a supervisor know if you are working alone.

California

Supervisors must implement the following procedures when temperatures exceed 95 degrees Fahrenheit:

- Review high-heat procedures.
- Implement an effective communication system with employees working outside and maintain frequent contact with employees to be on the lookout for potential heat-related illnesses.
    - Direct supervisor observation may be sufficient where employees work in groups of 20 or less.
    - Employers may use the buddy system when direct observation is not practical. The employers must train their employees to stay in contact, observe and immediately report any signs of heat illness.
    - Lone workers may communicate by radio or cell phone. Employers are required to contact lone workers regularly, ascertain their condition and provide emergency services as needed.
- Have employees check themselves and coworkers frequently for signs and symptoms of heat-related illnesses.
- Remind employees to drink plenty of water throughout their shift and take cool-down breaks when needed.

California OSHA heat-related illness prevention page

Field research

Students and field research employees should consult this program and consider heat a potential risk while drafting their Field Research Safety Plan. Employees should refer to their Field Research Safety Plan for elements such as emergency procedures, communication plans and other relevant information.

Training

Employees must complete the ASU EHS heat stress training annually before beginning to work in high-heat conditions. Supervisors must ensure employees have completed training before being permitted to work in high-heat conditions.

Email EHS or call 480-965-1823 with questions or for more information on heat stress.

Appendix A: Definitions

Acclimatization: The approximately 14-day process or result of adapting to a new climate or conditions.

Drinking water: Potable water that is safe to drink and suitably cool in temperature.

Electrolytes: Minerals that help the body maintain optimal function.

Excessive heat warning: Issued within 12 hours of a heat-risk forecast identified as high or very high by the National Weather Service.

Excessive heat watch: Issued 2–7 days before increased chances of a dangerous heat with temperatures forecasted to be high or very high according to the heat-risk forecast.

Heat-related illness: A medical condition caused by the body's inability to withstand heat.

Heat index: The outdoor temperature when factoring in relative humidity with the air temperature.

Heat risk: An algorithm by the NWS that considers how unusually high the temperatures are where you are located, time of year, duration of heat and whether the heat poses an elevated risk for heat-related illnesses. It is currently an NWS prototype and is only used in the western half of the United States.

Heat stress: The amount of heat one experiences when considering factors such as the environment, clothing, activities being conducted and metabolic heat.

Location of work: The location where employees do their assigned jobs. Temperature readings should be taken based on this location.

Potable water: Water that is safe to drink.

Relative humidity: The amount of water vapor in the air as a percentage of the amount needed for saturation at the same temperature.

Risk factors: Conditions or factors that decrease the body's ability to withstand heat. Factors include the environment, workload, PPE and the employee's overall health.

Shade: When direct sunlight is blocked. It can be natural, such as tree coverings or man-made, such as canopies or tents.

Workload: The amount of work being done by employees. It is determined based on the physical demand of the job being conducted and is categorized into three categories:

- **Light**: Sitting, standing, light arm and hand work and occasional walking.
- **Moderate**: Normal walking or moderate lifting.
- **Heavy**: Heavy material handling or walking at a fast pace.

Appendix B: Heat Index Chart

Heat Index Chart with Health Effects and Safety Recommendations

How to use the chart: 1. Go to www.wrh.noaa.gov/psr and select your location to obtain the local temperature in Fahrenheit and relative humidity (RH) **2.** Find the corresponding temperature and RH on the chart. The box that connects the two numbers will contain the current heat index (HI) Notice the color of this box. **3.** Find the box with the same color and read about the health effects of the Heat Index and safety recommendations to follow.

Extreme Danger **Danger** **Extreme Caution** **Caution** **Most common in AZ**

°F	RELATIVE HUMIDITY (%)																				
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
140	125																				
135	120	128																			
130	117	122	131																		
125	111	116	123	131	141																
120	107	111	116	123	130	139	148														
115	103	107	111	115	120	127	135	143	151												
110	99	102	105	108	112	117	123	130	137	143	150										
105	95	97	100	102	105	109	113	118	123	128	135	142	149								
100	91	93	95	97	99	101	104	107	110	115	120	125	132	138	144						
95	87	88	90	91	93	94	96	98	101	104	107	110	114	119	124	130	136				
90	83	84	85	86	87	88	90	91	93	95	96	98	100	102	106	109	113	117	122		
85	78	79	80	81	82	83	84	85	86	87	88	89	90	91	93	95	97	99	102	105	108
80	73	74	75	76	77	77	78	79	79	80	81	81	82	83	85	86	86	87	88	89	91
75	69	69	70	71	72	72	73	73	74	74	75	75	76	76	77	77	78	78	79	79	80
70	64	64	65	65	66	66	67	67	68	68	69	69	70	70	70	71	71	71	71	71	72

Heat Index: 130+ degrees F	Health Effect: Heatstroke/sunstroke is highly likely with continued exposure Recommendations: Avoid strenuous outdoor activity. Stay indoors in an air conditioned facility. Stay well-hydrated. Drink 10 gulps every 20 minutes. Check on your family, friends, and neighbors.
Heat Index: 105-129 degrees F	Health Effect: Sunstroke, heat cramps and heat exhaustion are likely. Heat stroke is possible with prolonged exposure and/or physical activity Recommendations: Avoid strenuous outdoor activity; Stay indoors in an air conditioned facility; Stay well-hydrated. Drink 10 gulps every 20 minutes.
Heat Index: 90-104 degrees F	Health Effect: Sunstroke, heat cramps and heat exhaustion are possible with prolonged exposure and/or physical activity Recommendations: Limit strenuous outdoor activity; Limit your time outdoors; Stay well-hydrated. Drink 10 gulps every 20 minutes.
Heat Index: 80-89 degrees F	Health Effect: Fatigue is possible with prolonged exposure and/or physical activity Recommendations: Limit your time outdoors; Stay well-hydrated. Drink 10 gulps every 20 minutes.

Arizona Department of Health Services

ADHS 2011, http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/avgrh.html

Appendix C: References

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