

Safety Manual

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Heat Stress

N.C. A&T State University is committed to the health and safety of our students, faculty, staff and visitors. This document will help to minimize the detrimental effects of excessive heat on N.C. A&T employees, faculty, and students who work outdoors or within indoor environments with elevated temperatures. There are many steps that can be taken to prevent heat stress. Some of these steps can be taken by the employee/student, while other preventive measures can be implemented by supervisors and departments. The appropriate way to prevent heat stress depends on the work being done, the environment in which it must be done, and the employees doing the work.

Responsibilities

The university, through the EHS office and supervisors, will monitor the temperature and heat index. Measurement will be taken by the wet bulb globe temperature (WBGT) or using the OSHA Heat Safety Tool app. Upon a moderate risk level (or higher), employees and students will be notified either through email and internal communications.

As the seasonal temperatures rise, students and employees should acclimate and increase water intake to curb the effects of heat stress.

Preventative measures should be implemented according to the Heat Index (below):

Heat Index	Risk Level	Protective Measures
Less than 91°F	Lower (Caution)	Basic heat safety and planning
91°F to 103°F	Moderate	Implement precautions and heighten awareness
103°F to 115°F	High	Additional precautions to protect workers
Greater than 115°F	Very High to Extreme	Triggers even more aggressive protective measures

NOAA's National Weather Service

Heat Index

Temperature (°F)

	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

- Caution
 Extreme Caution
 Danger
 Extreme Danger

Environmental and personal factors

- High temperature and humidity, direct sun exposure, no breeze or wind
- Low liquid intake, Heavy physical labor
- Waterproof clothing
- No recent exposure to hot workplaces, Lack of acclimatization
- Lack of physical fitness, Age, Dehydration, Obesity

Acclimating

Heat acclimation is the process of training your body to perform more efficiently in hot weather. Through heat acclimation your body undergoes physiological changes that improve cardiovascular function, cause your body to sweat sooner and more efficiently, and allow you to exercise longer. People who have construction, roofing, or landscaping jobs should learn how to acclimate to hot weather to reduce the risk of heatstroke and heat-related deaths.

Allow 10 to 14 days to acclimate your body to the heat. Make a schedule to start your acclimation process. It usually takes about two weeks of at least one hour of training in the heat each day to acclimate.

Perform small increments of intense activity. When you first begin, you may find that you are easily fatigued by the hot weather. Start your acclimation process with about 15 minutes of intense exercise the first day. For the first week, increase the time and intensity of your work by no more than 20% each day. In the first 5 days of heat acclimation, your body improves its cardiovascular functions in the heat.

Increase your fluid intake. Staying hydrated is extremely important when working in hot weather. Dehydration can result in decreased blood flow to the skin, decreased sweat production, reduced blood volume, and an increase in your core body temperature. The water lost from sweat must be replaced while working.

- Be sure to drink fluids both during the work and when you are done. Because high heat results in an increased fluid loss, don't wait until you feel thirsty. Drink frequently.

- More sodium will be retained by the body and less excreted in your sweat and urine if you have more fluid in the body. This allows the body to maintain its proper sodium concentrations.
- Consume enough sodium to replace what is lost by sweating. A low-sodium diet may impair your body's ability to maintain its sodium levels.

Maintain the heat acclimation. It only takes about one week for you to start feeling the loss of the physiological changes you worked so hard for. To maintain these changes, you need to continue to work out in the heat at least every other day. Keep to a regular schedule of outdoor exercise (at least 2-3 times per week).

Preventive measures employees/students can take

Employees should take special precautions to avoid heat-related illness in unusually hot weather when working outdoors or in unconditioned indoor environments. People suffer heat-related illness when their bodies are unable to regulate internal body temperature. In hot weather, the body normally cools itself by sweating. Under some conditions, however, sweating isn't enough. Such conditions include high humidity, where air movement is limited, working in the direct sun, heavy physical exertion and poor physical condition. Some medical conditions and medications can also reduce the body's ability to tolerate heat. Still, heat-related illness is preventable by following these guidelines when working outdoors in hot weather:

- Drink small amounts of cool water frequently to prevent dehydration. Drink throughout the day to relieve thirst and maintain an adequate urine output.
- Plain water is usually adequate without need to take additional salt or minerals beyond those in your diet. A sports beverage can replace the salt and minerals you lose in sweat.
- Wear appropriate clothing. During periods of elevated temperature, employees should wear light-colored, lightweight, loose-fitting cotton clothing that allows ventilation of air to the body.
- Protect yourself from the sun by wearing a wide-brimmed hat. (Sunglasses and sunscreen—SPF 15 or higher—are also recommended.)
- Pace yourself. Start slowly and pick up the pace gradually.
- Stand or sit up slowly. Flex leg muscles before moving.
- Take time to cool down. Rest often in shady areas. A few hours in air conditioning can help you stay cooler later in the heat.
- Take time to acclimate to heat and humidity. You will have a greater tolerance for heat if you limit physical activity until you become accustomed to it. Acclimation to a stressful environment may take days or weeks. Gradual adaptation improves the employees' ability to tolerate heat by sweating more efficiently, thus cooling the body and making it easier to maintain a normal temperature.

Common Signs of Heat Stress

Condition	Sign/symptom	First aid
Heat Cramps	Painful muscle spasms, usually in the legs or abdomen Heavy sweating	Water intake Sport drink intake (Gatorade, Powerade, etc.) Rest in cool environment
Heat Exhaustion	Pale and clammy skin Possible fainting Weakness, fatigue Headache Nausea Dizziness Heavy sweating Exhaustion Blurred vision Body temp slightly elevated	Move victim to a cooler place If victim is conscious, give small amounts of cool water to drink Remove or loosen tight clothing Apply cool, wet towels to the skin Watch for changes in condition If the victim refuses water, vomits, or begins to lose consciousness, call UPD 334-7675
Heat Stroke	Cessation of sweating Skin hot and dry Red face High body temperature Unconsciousness Collapse Convulsions Confusion or erratic behavior Life threatening condition	Immediately move victim to a cooler place Quickly cool the victim's body by removing or loosening tight clothing and applying cool, wet towels to the skin Apply ice or cold packs, wrapped in a cloth, to the wrists, ankles, groin, neck, and armpits Call UPD 334-7675 or transport to the hospital

Contact N.C. A&T EH&S office at 334-7992 if you have any questions.

Preventive measures supervisors/athletic trainers can take

Departments and supervisors with employees who normally work outdoors or in unconditioned indoor environments need to address heat stress in their job procedures (i.e., preventive measures) appropriate to their work and the situation.

Preventive measures selected for inclusion in the Job Safety Analysis are at the discretion of the employee's supervisor and department. Preventive measures that can be implanted by a supervisor are also called *administrative controls* or work strategy controls.

Administrative controls are strategies using managerial involvement to limit exposure to a particular hazard. In the case of heat stress, administrative controls limit the amount of time an employee is exposed to elevated temperatures. Administrative controls can be changes to how the job is performed, or work schedule changes to when the job is performed.

Specific to Athletics

Tips:

- Have sports drinks on hand for workout sessions lasting longer than an hour.

- Keep beverages cold – cold beverages are consumed 50 percent more than warm beverages.
- Hydrate before, during and after activity.
- Remove unnecessary equipment, such as helmets and padding, when environmental conditions become extreme.
- Clothing worn by athletes should be light colored, lightweight and protect against the sun.
- For the first week or so, hold shorter practices with lighter equipment so players can acclimate to the heat.
- Follow a work-to-rest ratio, such as 10-minute breaks after 40 minutes of exercise.
- Get an accurate measurement of heat stress using a wet-bulb globe temperature, which accounts for ambient temperature, relative humidity and radiation from the sun.
- If someone is suffering from exertional heat stroke, remember to cool first and transport second.
- Have large cold tubs ready before all practices and games in case cold water immersion is needed to treat exertional heat stroke.

Rest and Cool Down Breaks

Consider changes to your break practices to lower the risk of heat stress. Possible changes during heat-stressed conditions include:

- Encourage employees to take breaks and hydrate any time they feel necessary.
- Pace the job to allow more frequent breaks for fluid intake and sufficient recovery time.
- Take a break in a shaded area or an air-conditioned building.

Work Schedule Changes (for Supervisors)

Consider changes to your work to lower the risk of heat stress. Possible changes include:

- When feasible, departments can schedule routine maintenance and repair work, which exposes employees to heat-stressed conditions, until cooler periods of the day or cooler seasons. Limit sun exposure during mid-day hours.
- If a job is essential for continuing university operations, consider implementing a worker rotation schedule every hour or sooner. Allow sufficient recovery time for each worker.
- Implement flexible work schedules (e.g., 6:00 a.m. to 2:00 p.m.).
- Permit heavy work only from 6:00 a.m. to 9:00 a.m. or earlier.
- Complete all other moderate to light work before 12:00 Noon.
- If extensive PPE is required, then those jobs should be scheduled for the cooler part of the day (i.e., early mornings).

Other preventive measures in the work environment

Engineering controls are physical changes made to the environment. To minimize the risk of heat-related disorders, consider these steps:

- Open windows and add fans to increase air movement to provide air cooling and ventilation of heat.
- Shield radiant heat sources or local exhaust at the point of heat generation.
- Provide shaded areas during remote outdoor work (e.g., constructing temporary shelters using tarps)
- Equip tractors, lawnmowers, and other outdoor equipment with cabs or canopies.

FOR HELP AND MORE INFORMATION

For assistance, please contact N.C. A&T State University's Department of Environment, Health and Safety (EHS) at 334-7992. EHS can also suggest appropriate controls to reduce your risk of heat-related illness.