

University of Alaska Anchorage	Section EHS/RM
ADMINISTRATIVE SERVICES MANUAL	Program No.
EHS/RM Programs	Page 1
Title <i>HEAT STRESS SAFETY</i>	Effective Date 06/10/2021

1. Purpose

University of Alaska Anchorage (UAA) employees, student workers, faculty, staff, and outside contractors who are exposed to heat on the job, whether in an indoor or outdoor environment. Every year, thousands of workers become sick from occupational heat exposure and some are fatally injured. This program for Heat Stress Safety is intended to ensure workers are knowledgeable in the hazards of working in a high heat environment and the steps necessary to avoid heat-related illness.

2. Objective

UAA, in its continuing effort to provide employees with safe, healthful working conditions, and to comply with the Occupational Safety and Health Act is implementing the following program for heat stress to protect people working at the University, by helping employees, student workers, faculty, staff, and outside contractors better understand heat related illness and prevention.

3. Scope

This policy applies to UAA employees, student employees, faculty, staff, and outside contractors working at UAA in hot environments. This standard applies to UAA projects where ambient (not adjusted) temperatures exceed 70 degrees Fahrenheit (°F) (21 degrees Celsius (°C) for personnel wearing chemical-protective clothing, including semi-permeable or impermeable protective clothing such as Tyvek or Saranex coveralls, and 90°F (32°C) for personnel wearing normal permeable work clothes. Permeable clothing refers to clothes of standard cotton or synthetic materials.

4. Definitions

Acclimatization - the beneficial physiological adaptations that occur during repeated exposure to a hot environment. These physiological adaptations include:

- Increased sweating efficiency (earlier onset of sweating, greater sweat production, and reduced electrolyte loss in sweat).
- Stabilization of the circulation.
- The ability to perform work with lower core temperature and heart rate.
- Increased skin blood flow at a given core temperature.

Acclimatization can be accomplished by gradually increasing exposure time in hot environmental conditions over a 7 to 14-day period.

Heat Cramps - Painful cramps caused by the loss of body salts and fluids during sweating, resulting in low salt levels in muscles. Tired muscles that are used for performing the work are usually the ones most affected by cramps. Cramps may occur during or after working hours

University of Alaska Anchorage	Section EHS/RM
ADMINISTRATIVE SERVICES MANUAL	Program No.
EHS/RM Programs	Page 2
Title <i>HEAT STRESS SAFETY</i>	Effective Date 06/10/2021

Heat exhaustion - The body's response to loss of water and salt from heavy sweating. Signs include headache, nausea, dizziness, weakness, irritability, thirst, and heavy sweating.

Heat index - A measure of how hot it really feels when relative humidity is factored in with the actual air temperature.

Heat rash - Skin irritation caused by sweat that does not evaporate from the skin. Heat rash is the most common problem in hot work environments.

Heat stroke - The most serious form of heat-related illness, happens when the body becomes unable to regulate its core temperature. Sweating stops and the body can no longer rid itself of excess heat. Signs include confusion, loss of consciousness, and seizures

Wet Bulb Globe Temperature (WBGT) - A measure of the heat stress in direct sunlight, which considers: temperature, humidity, wind speed, sun angle and cloud cover (solar radiation). This differs from the heat index, which takes into consideration temperature and humidity and is calculated for shady areas

5. Authority and Responsibilities

In addition to the roles and responsibilities outlined in the UAA Training Program, the following apply to the Heat Stress Safety Program.

EHS/RM

- Work with departments upon request to determine heat risks for specific tasks or job classifications
- Assist departments upon request with methods to determine heat index and employee monitoring
- Create, track, and/or conduct inspections on heat stress safety where applicable with this standard

Supervisor

- Ensure personnel have access to water rest and shade when working in hot environments
- Take steps to acclimatize personnel to work in hot environments when applicable
- Ensure personnel are trained on the signs of heat stress
- Monitor personnel for signs of heat stress and illnesses

Department Safety Coordinator

- Assist in the determination of effective work, rest, shade regimen
- Conduct periodic inspections of work in hot environments

University of Alaska Anchorage	Section EHS/RM
ADMINISTRATIVE SERVICES MANUAL	Program No.
EHS/RM Programs	Page 3
Title <i>HEAT STRESS SAFETY</i>	Effective Date 06/10/2021

- Assist in the monitoring personnel for signs of heat stress and illnesses

Employees/Student Workers

- Know the signs of heat stress
- Alert supervisor if more water, shade or rest is needed to complete a job or task safely
- Assess work to determine if adequate water, shade and rest are available for the expected task and workload
- Identify when there may be a safer alternative to reduce heat stress risks and communicate with Supervisor and Department Safety Coordinator

Outside Contractors

- Perform all work in compliance with their company's heat stress safety program, which will be reviewed and approved by the EHS/RM department
- If the company does not have a program, they must comply with this program

6. Hazards Associated with work in high heat environments

Every year, dozens of workers die and thousands more become ill while working in extreme heat or humid conditions. There are a range of heat illnesses and they can affect anyone, regardless of age or physical condition.

When people work in hot environments the body sheds excess heat through blood circulation and sweating. As air temperatures get higher, the body can not get rid of the excess heat as easily and body temperature may rise. Excessive exposure to heat can cause a several heat related illnesses including the following:

- Heat Rash
- Heat Cramps
- Heat exhaustion
- Heat Stroke

Heat stroke is the most serious of the above conditions and in severe cases can result in death.

7. Engineering Controls

Engineering controls are design plans or changes to the working environment to prevent or reduce employee exposure to heat hazards. The following example of engineering controls should be considered in area design to reduce the risk of heat stress.

- Installation of air conditioning in hot work areas, break rooms or equipment cabs

University of Alaska Anchorage	Section EHS/RM
ADMINISTRATIVE SERVICES MANUAL	Program No.
EHS/RM Programs	Page 4
Title <i>HEAT STRESS SAFETY</i>	Effective Date 06/10/2021

- Installation of increased air ventilation systems
- Provide cooling fans in hot work areas
- Install reflective shields to reduce heat in work areas from heat producing equipment
- Install covered areas to reduce sun exposure in outdoor work areas
- Insulate hot surfaces
- Maintain heat and steam systems to reduce leaks into the work area

8. Administrative Controls

Administrative controls are safe work practices and procedures designed to reduce the risks associated with working in hot areas. Examples of administrative controls include the following:

- Train employees on the signs and symptoms of heat exposure and ensure personnel know how to respond to reduce the potential for heat stress
- Take steps to allow workers to acclimate to new hot work places or tasks
- Provide adequate potable water accessible to personnel when needed
- Rotate job functions among personnel to reduce exposure to heat

9. Procedures

Supervisors and personnel working in the area will address heat stress anytime temperatures are anticipated to meet the action levels identified in Table 2 of this standard. For employees wearing chemical-protective clothing, physiological monitoring, described in this program, is the most effective approach, because evaporative cooling capability is limited.

General Heat Stress Reduction Procedures

- Investigate the use of auxiliary cooling devices in extreme heat conditions
- When feasible encourage wearing lightweight, loose-fitting clothing, and a hat with a brim to keep the sun off the head and face
- Conduct briefings for employees regarding health hazards and control measures associated with heat stress whenever conditions require the implementation of heat stress monitoring
- Provide cool water, as much as 1 quart per hour may be necessary in high heat conditions
- Allow employees who are not accustomed to working hot environments appropriate time for acclimatization
- Provide adequate break areas out of the sun

University of Alaska Anchorage	Section EHS/RM
ADMINISTRATIVE SERVICES MANUAL	Program No.
EHS/RM Programs	Page 5
Title <i>HEAT STRESS SAFETY</i>	Effective Date 06/10/2021

Heat Stress Hazard Determination

Heat stress is influenced by air temperature, radiant heat, humidity, and physical demand. Workers can monitor the heat index for work outdoors using weather monitoring websites or OSHA’s Heat Index App. If available, the Wet Bulb Globe Temperature (WBGT) is a useful index of the environmental contribution to heat stress. Because Heat index and WBGT is only an index of the environment, the contributions of work demands, clothing, and state of acclimatization must as be accounted for, as described in the steps below.

- Monitor ambient temperature and conduct heat stress monitoring in accordance with the work plan. Revise the heat stress monitoring and controls if there are any reports of discomfort due to heat stress.
- Monitor temperatures in each unique work environment in which workers perform work (ex. Take WBGT measurements inside truck cabs for truck drivers, and take separate WBGT measurements in specific areas where personnel are working, etc).
- Determine the approximate workload of each worker or group of workers. The following examples can be used for comparison

Table 1 - Examples of Activities with Workload Categories

Categories	Example Activities
Resting	<ul style="list-style-type: none"> • Sitting quietly • Sitting with moderate arm movements
Light	<ul style="list-style-type: none"> • Sitting with moderate arm and leg movements • Using a table saw • Standing with light or moderate work at machine or bench and some walking
Moderate	<ul style="list-style-type: none"> • Scrubbing in a standing position • Walking with moderate lifting or pushing • Walking on level at 6 km/hr (3.7 mph) while carrying 3 kg (6.6 lbs) load
Heavy	<ul style="list-style-type: none"> • Carpenter sawing by hand • Shoveling dry sand • Heavy assembly work on a non-continuous basis • Intermittent heavy lifting with pushing or pulling (ex. pick and shovel work)
Very Heavy	<ul style="list-style-type: none"> • Shoveling wet sand

University of Alaska Anchorage	Section EHS/RM
ADMINISTRATIVE SERVICES MANUAL	Program No.
EHS/RM Programs	Page 6
Title <i>HEAT STRESS SAFETY</i>	Effective Date 06/10/2021

Determine the approximate proportion of work within an hour during a typical shift. Typically, the initial work schedule will be 60 minutes of work per hour (100% work) with a small break in the morning and afternoon, as appropriate, and a 30-minute lunch break mid-day.

Compare the Heat Index or WBGT values measured in to the screening criteria values in Table 2, below, using the determinations in the sub-bullets following Table 2.

Table 2 - Screening Criteria for Heat Stress Exposure (F/C)

Work Cycle	Acclimated				Unacclimated			
	Light Work	Mod. Work	Heavy Work	Very Heavy Work	Light Work	Mod. Work	Heavy Work	Very Heavy Work
100% Work (60 min/ hour)	85.1/ 29.5	81.5/ 27.5	78.8/ 26.0	N/A	81.5/ 27.5	77.0/ 25.0	72.5/ 22.5	N/A

- If the measured Heat Index or WBGT is less than the table value, there is little risk of excessive exposure to heat stress, and work can continue. Continue to monitor temperatures. However, if there are any reports of heat-related disorders, then the analysis of little risk should be reconsidered.
- If the measured heat index or WBGT is greater than the table value, institute heat stress controls, including a work-rest cycle, and perform physiological monitoring as described later in this standard.
- Because of the physiological strain associated with very heavy work among less fit workers regardless of heat index or WBGT, values are not provided in Table 2 for continuous work. Physiological monitoring should always be implemented under these conditions.
- For workers wearing semi-permeable or impermeable clothing, such as Tyvek or Saranex, the heat index or WBGT procedures cannot be used. For these situations, workers should begin physiological monitoring as soon as the temperature in the work area exceeds 70°F (21°C).

Physiological Monitoring

Physiological monitoring provides a means to assess the effectiveness of the heat stress controls (training, hydration, work-rest cycles, etc.) that are in place. Based on the results of physiological monitoring and self-assessment, work-rest cycles can be adjusted to more

University of Alaska Anchorage	Section EHS/RM
ADMINISTRATIVE SERVICES MANUAL	Program No.
EHS/RM Programs	Page 7
Title <i>HEAT STRESS SAFETY</i>	Effective Date 06/10/2021

effectively control heat stress by shortening the work period, or to allow for long work periods if workers are recovering adequately during rest breaks.

- Perform physiological monitoring as soon as the employee stops working and begins their break (rest). Perform physiological monitoring at least every hour. Base rest breaks on the results of the monitoring, workers' self-assessment, and professional judgment.
 - Example 1: If the heat index or WBGT is 85°F (29.4°C) or less for acclimatized, light-duty workers, they can work 60 minutes per hour (100% work), and they need only take their regularly scheduled breaks.
 - Example 2: If the heat index or WBGT is greater than 85°F (29.4°C) for acclimatized, light-duty workers, physiological monitoring must be performed, and workers' work-rest cycles must be adjusted as described below.
- Have workers assess themselves and their body's reaction to the heat and work conditions (self-assessment), and report any signs or symptoms of heat illness located in Table 3. These can include nausea or dizziness, heat cramps, extreme thirst, or very dark urine.
- Based on the results of the physiological monitoring and on the workers' self-assessments, the work period may be adjusted as follows:
 - The work period may be increased (generally, by 5- to 10-minute intervals, up to a maximum of 4 hours) if the results of the first 2 hours of the physiological monitoring and the workers' self-assessments indicate that workers are recovering adequately (see below), and on the judgment of the Health and Safety Technician.
 - The work period must be decreased if the results of the physiological monitoring and the workers' self-assessment indicate that workers are NOT recovering adequately (see below).
- Perform physiological monitoring.

The worker or the Health and Safety Technician must measure and record body temperature and pulse rate as described below.

- Body Temperature Monitoring
 - Monitor body temperature to determine if employees are adequately dissipating heat buildup. Ear probe thermometers which are adjusted to oral temperature (aural temperature) are convenient and the preferred method of measurement. Determine work/rest regimen as follows:
 - Measure oral body temperature at the end of the work period. Oral body

University of Alaska Anchorage	Section EHS/RM
ADMINISTRATIVE SERVICES MANUAL	Program No.
EHS/RM Programs	Page 8
Title <i>HEAT STRESS SAFETY</i>	Effective Date 06/10/2021

temperatures are to be obtained prior to the employee drinking water or other fluids.

- If temperature exceeds 99.6°F (37.5°C), shorten the following work period by 1/3 without changing the rest period.
 - If, at the next rest period, temperature still exceeds 99.6°F (37.5°C), the worker should not be allowed to continue work until repeated temperature measurements are in the acceptable range (i.e., less than 99.6°F). Do not leave the worker alone during the recovery time. Watch for signs of heat illness and be prepared to implement emergency response as necessary.
 - Do not allow a worker to wear impermeable PPE when his/her oral temperature exceeds 100.6°F (38.1°C).
 - Have employees assess themselves and their body's reaction to the heat and work conditions, and report any signs or symptoms of heat stress, including, but not limited to, feeling nauseous or dizzy, skin rash or skin irritation, muscle cramps, weakness or fatigue, extreme thirst, dizziness, blurred vision, headache, or very dark urine.
- Pulse Rate Monitoring
- Take the radial (wrist) pulse as early as possible in the rest period and determine the worker's heart rate in beats per minute. The heart rate is determined by counting the pulse for ten seconds and multiplying the number by 6 to get the beats per minute. Record this as P1.
 - Wait 2 minutes and repeat the pulse measurement. Record this as P2.
 - If P1 is greater than or equal to 110 beats per minute (bpm) and if (P1 - P2) is less than or equal to 10 bpm (indicating that workers are not recovering adequately), shorten the next work cycle by 1/3 without changing the rest period.
 - At the next rest period, if P1 is still equal to or greater than 110 bpm, and if (P1 - P2) is still less than or equal to 10 bpm, shorten the following work cycle by 1/3 without changing the rest period.
 - At the third rest period, if P1 is still equal to or greater than 110 bpm and (P1 - P2) is still less than or equal to 10 bpm, the worker should not be allowed to continue work until repeated pulse measurements are in the acceptable range (i.e., P1 is less than 110 bpm and (P1 - P2) is greater than 10 bpm). Do not leave the worker alone during the recovery time. Watch for signs of heat illness and be prepared to implement emergency response as necessary.

University of Alaska Anchorage	Section EHS/RM
ADMINISTRATIVE SERVICES MANUAL	Program No.
EHS/RM Programs	Page 9
Title <i>HEAT STRESS SAFETY</i>	Effective Date 06/10/2021

- Record monitoring results and workers' self-assessments.

Table 3 - Heat Illness Symptoms and First Aid Measures

Illness	Symptoms	First Aid*
Heatstroke	<ul style="list-style-type: none"> • Confusion • Fainting • Seizures • Excessive sweating or red, hot, dry skin • Very high body temperature 	<p>Call 911</p> <p>While waiting for help do the following:</p> <ul style="list-style-type: none"> • Place worker in shady, cool area • Loosen clothing, remove outer clothing • Fan air on worker • Apply cold packs in arm pits • Wet worker with cool water • Provide fluids (preferably water) as soon as possible • Stay with worker until help arrives
Heat Exhaustion	<ul style="list-style-type: none"> • Cool, moist skin • Heavy sweating • Headache • Nausea or vomiting • Dizziness • Light headedness • Weakness • Thirst • Irritability • Fast heart beat 	<ul style="list-style-type: none"> • Have Worker sit or lie down in a cool shady area • Give worker plenty of water or other cool beverages to drink • Cool worker with cold compresses/ice packs • Take to clinic or emergency room for medical evaluation or treatment if signs or symptom worsen or do not improve within 60 minutes
Heat Cramps	<ul style="list-style-type: none"> • Muscle spasms • Pain • Usually in abdomen, arms, or legs 	<ul style="list-style-type: none"> • Have worker rest in shady, cool area • Worker should drink water or other cool beverages • Wait a few hours before allowing worker to return to strenuous work • Have worker seek medical attention if cramps don't go away

University of Alaska Anchorage	Section EHS/RM
ADMINISTRATIVE SERVICES MANUAL	Program No.
EHS/RM Programs	Page 10
Title <i>HEAT STRESS SAFETY</i>	Effective Date 06/10/2021

Illness	Symptoms	First Aid*
Heat rash	<ul style="list-style-type: none"> • Clusters of red bumps on skin • Often appears on neck, upper chest, folds of skin 	<ul style="list-style-type: none"> • Try to work in a cooler, less humid environment • Keep the affected area dry
* Remember: if you are not a medical professional, use this information as a guide only to help worker in need.		

10. Inspections

To ensure heat stress hazards are identified and protective measures are put in place the following inspections are required:

Prior to every task where heat may reach levels identified in Table Two, supervisors and personnel will review the work plan to ensure adequate measures to provide water, rest, shade and monitoring.

Periodically Supervisors or their designee should observe work in hot work areas to ensure personnel are adequately protected and have the facilities to reduce heat stress risk.

11. Training

UAA shall provide a training program for each employee required to perform work in hot environments.

The program shall enable each employee to recognize hazards related to heat stress, and shall train each employee in the procedures to be followed to minimize these hazards.

The employer shall ensure that each employee has been trained by a competent person in the following areas, as applicable:

- Risk factors for heat-related illness
- Different types of heat-related illness, including how to recognize common signs and symptoms
- Heat-related illness prevention procedures
- Importance of drinking small quantities of water often
- Importance of acclimatization, how it is developed, and how your worksite procedures address it
- Importance of immediately reporting signs or symptoms of heat-related illness to the supervisor

University of Alaska Anchorage	Section EHS/RM
ADMINISTRATIVE SERVICES MANUAL	Program No.
EHS/RM Programs	Page 11
Title <i>HEAT STRESS SAFETY</i>	Effective Date 06/10/2021

- Procedures for responding to possible heat-related illness
- Procedures to follow when contacting emergency medical services

Retraining shall be provided for each employee as necessary if an accident occurs, new workplace hazards are identified, a near loss incident has occurred, or there is a change in the workplace, so that the employee maintains the understanding and knowledge acquired through compliance with this section.

12. Program Evaluation

The Heat Stress Safety program shall be evaluated on an annual basis utilizing the protocols set forth by EHS/RM. The evaluation team will consist of a department safety coordinator and a designee from EHS/RM. EHS/RM will define the scope of the evaluation. The final report will be developed by the EHS/RM utilizing the information received during the evaluation. The deficiencies determined in the report will be documented and corrective action plans will be developed.

13. References

There are currently no specific OSHA standards for occupational heat exposure. However, Under the General Duty Clause, Section 5(a)(1) of the Occupational Safety and Health Act (OSHA) of 1970, employers are required to provide their employees with a place of employment that "is free from recognizable hazards that are causing or likely to cause death or serious harm to employees."

14. Revision History

Revision Number	Date Revised	Description of Change	Revised By	Approved By
0		Initial Issue		
1				
2				
3				