

Temperature Extremes Program

Document History

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Definitions

Acclimatization - the physiological changes that occur in response to a succession of days of exposure to environmental heat stress and reduce the strain caused by the heat stress of the environment; and enable a person to work with greater effectiveness and with less change of heat injury.

Core Body Temperature - the temperature of the tissues and organs of the body.

Dry Bulb Temperature - the temperature of air recorded by a thermometer when it is not affected by moisture present in air, and shielded from radiation.

Evaporative Cooling - the cooling effect of moisture (sweat) evaporating from a surface (skin), and is the body's primary cooling mechanism.

Frostbite - the freezing of body tissue (usually skin) that results when the blood vessels contract, reducing blood flow and oxygen to the affected body parts.

Heat Cramp - a heat-related illness characterized by spastic contractions of the voluntary muscles, usually associated with restricted salt intake and profuse sweating without significant body dehydration.

Heat Exhaustion - a heat-related illness characterized by elevation of core body temperature (above 100.4° F) and abnormal performance of one or more organ systems, without injury to the central nervous system. Heat exhaustion may signal impending heat stroke.

Heat Index - a measure of how hot it feels ("apparent temperature") when relative humidity is factored in with the actual air temperature.

Heat Strain - the physiological response to the heat load (external or internal) experience by a person, in which the body attempts to increase heat loss to the environment in order to maintain a stable body temperature.

Heat Stress - the physiological response to the heat load (external or internal) experience by a person, in which the body attempts to increase heat loss to the environment in order to maintain a stable body temperature.

Heat Stroke - an acute medical emergency caused by exposure to heat from an excessive rise in body temperature (above 106° F) and failure of the temperature-regulating mechanism. Injury occurs to the central nervous system characterized by a sudden and sustained loss of consciousness preceded by vertigo, nausea, headache, cerebral dysfunction, bizarre behavior, and excessive body temperature.

Heat Tolerance - the physiological ability to endure heat and regulate body temperature at an average or better rate than others, often affected by the individual's level of acclimatization and physical conditioning.

Hyperthermia - a condition of having an abnormally high core body temperature (typically higher than 99° F), usually caused by a combination of prolonged exposure to high temperature environments and an increased metabolic rate resulting from a person's work load.

Hypothermia - a condition of having an abnormally low core body temperature (typically lower than 95° F), usually caused by prolonged exposure to low temperature environments.

Globe Temperature - a measure of the heat stress in direct sunlight, which takes into account: temperature, humidity, wind speed, and solar radiation.

Relative Humidity - the ratio of the water vapor present in the ambient air to the water vapor present in saturated air at the same temperature and pressure.

Wet Bulb Temperature (WBT) - the temperature of air recorded by a thermometer when its bulb is surrounded by a wet cloth exposed to the air, indicating the lowest temperature that can be reached by evaporative cooling.

Permissible Exposure Limit (PEL) - the legal amount of a chemical substance or physical agent an employee may be exposed to a, established by the Occupational Safety and Health Administration (OSHA).

Physician or Other Licensed Health Care Professional (PLHCP) - an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide, or be delegated the responsibility to provide, some or all of the health care services required by paragraph (e) of this section.

Potable Water - water that is suitable for drinking.

Introduction

The temperature extreme-related illnesses, procedures, and specifications described in this document are designed to establish standards for workplace hazard assessments as well as the proper preventive and corrective measures when working in temperature extremes. The contents of this program should be considered during all stages of work in order to avoid exposure to a hazardous weather conditions.

Purpose

Workers who are exposed to extreme temperatures may be at risk of heat or cold-related stress, as a result of the body's inability to regulate its internal temperature. When the body is unable to cool or warm itself, adverse health effects may occur, which range in severity from discomfort to death.

The purpose of this program is to comply with provisions set forth in OSHA's 29 General Duty Clause to provide a place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm. Facilities Management Occupational Health and Safety (FM-OHS) has developed this Temperature Extremes Program to minimize the effects of heat and cold stress on Facilities Management (FM) employees. This program contains the procedures and practices for safely working in temperature extremes.

Scope

This Temperature Extremes Program covers University of Virginia Facilities Management employees who are exposed to extreme hot or cold work conditions during their employment with FM. Elements of the Temperature Extremes Program include roles and responsibilities; definition, recognition, and treatment of heat/cold-related illnesses; and elements of/procedures for prevention of heat/cold-related illnesses.

Roles and Responsibilities

This Temperature Extremes Program for University of Virginia Facilities Management (FM) is a cooperative effort between FM-OHS, supervisors, and employees. Specific responsibilities relating to the Temperature Extremes Program are outlined below.

Facilities Management Occupational Health and Safety

Specific responsibilities of FM-OHS relating to temperature extremes are to:

- Administer the FM Temperature Extremes Program
- Conduct a hazard assessment if a supervisor notifies FM-OHS that work conditions which contribute to heat/cold-related illnesses are suspected
- Determine appropriate measures to protect from heat/cold-related illnesses
- Coordinate employee access to university supplied footwear when required to perform snow removal during snow events
- Provide monitoring (upon request) and assist employees with the development of procedures to minimize the adverse effects of heat and cold stress in the workplace
- Provide training to employees affected by heat and cold
- Maintain employee training records for duration of employment
- Maintain training materials, program evaluation records, and a current copy of the written Temperature Extremes Program
- Annually evaluate the Temperature Extremes Program and revise this program as needed

Supervisors

Supervisors oversee University of Virginia Facilities Management employees and their work. Specific responsibilities of supervisors related to temperature extremes are to:

- Review and comply with the provisions outlined in this program
- Ensure all employees are properly trained before working in extreme temperature conditions
- Assess the day-to-day heat or cold stresses on employees
- Assess employees work load and assigning work-rest schedules as needed
- Ensure all employees have the appropriate personal protective equipment (PPE) prior to working in extreme temperature conditions
- Ensure employees are familiar with this Temperature Extremes Program
- Inform FM-OHS if the need for a hazard assessment is suspected prior to beginning work
- Provide equipment that is designed to help regulate body temperature to employees as needed
- Provide employees with university supplied footwear when required to perform snow removal during snow events
- Provide an adequate supply of potable water and individual dispensing units for employees
- Inform FM-OHS of changes in workplace conditions (workload, protective clothing, or temperature) that may result in substantial increase in physiological burden placed on an employee
- Inform Human Resources of employees whose physical condition, temporary or permanent, could affect their ability to work in extreme temperature conditions (e.g. high blood pressure, higher in age, experienced weight gain)

Employees

Specific responsibilities of FM employees related to temperature extremes are to:

- Review and comply with the provisions outlined in this Temperature Extremes Program
- Complete training before working in extreme temperature conditions
- Wear appropriate FM-issued PPE only
- Report heat and cold stress concerns to his/her supervisor
- Inspect PPE used for temperature regulation prior to each use, and use in a manner that complies with instruction and training
- Report changes in physical condition that could affect the ability to work in extreme temperature conditions to his/her supervisor
- Provide feedback for annual program evaluation as requested by FM-OHS

Heat-Related Illnesses: Symptoms and Treatment

While working in hot weather conditions, the human body may not be able to maintain a normal temperature just by sweating. If this happens, heat-related illnesses may occur. The most common health problems caused by hot work environments include:

Dehydration

Dehydration is characterized as a deficit in total body water, and occurs when the body loses more fluid than it takes in. Dehydration is a major factor in most heat disorders, and should be a major consideration in preventing heat-related illnesses.

Symptoms:

- increasing thirst
- dry mouth

- weakness
- light-headedness
- darkening of the urine
- decreased urination

Treatment:

- Drink fluids that contain electrolytes (i.e. Gatorade)
- Caffeinated drinks should be avoided.

Heat Rash

Heat rash is a skin irritation caused by excessive sweating during hot, humid weather.

Symptoms:

- looks like red cluster of pimples or small blisters
- usually appears on the neck, upper chest, groin, under the breasts, and in elbow creases

Treatment:

- when possible, a cooler, less humid work environment is best treatment
- keep rash area dry
- powder may be applied to increase comfort
- ointments and creams should not be used

Heat Cramps

Heat cramps 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 symptoms of heat exhaustion.

Symptoms:

- muscle cramps
- pain
- spasms in the abdomen, arms, or legs

Treatment:

- drink water and have a snack and/or carbohydrate-electrolyte replacement liquid (e.g. sports drink) every 15-20 minutes
- avoid salt tablets
- get medical help if the employee: has a heart problem, is on a low sodium diet, or if cramps do not subside within 1 hour

Heat Exhaustion

Heat exhaustion is the body's response to loss of water and salt from heavy sweating. Workers most prone to heat exhaustion are those that are elderly, have high blood pressure, and those working in a hot environment.

Symptoms:

- headache
- nausea
- dizziness
- weakness
- irritability
- thirst
- heavy sweating
- elevated body temperature
- decreased urine output

Treatment:

- take employee to a clinic or emergency room for medical evaluation and treatment
- if medical care is unavailable, call 911

- move employee to a cool area and give fluids to drink (taking small, frequent sips)
- remove unnecessary clothing, including shoes and socks
- cool the employee with cold compresses or have worker wash head, face, and neck with cold water

Heat Stroke

Heat stroke is the most serious heat-related illness, and occurs when the body is no longer able to regulate its temperature. When this occurs, the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. The body's temperature can rise to 106° F or higher within 10-15 minutes. Heat stroke can cause death or permanent disability if emergency treatment is delayed or not given.

Symptoms:

- confusion or altered mental status
- slurred speech
- loss of consciousness
- hot, dry skin
- profuse sweating
- seizures
- very high body temperature

Treatment:

- call 911 for emergency medical care
- stay with worker until emergency medical services arrive
- move employee to a shaded, cool area, and remove outer clothing
- cool the employee quickly with a cold water or ice bath if possible; wet the skin, place cold, wet cloth on skin (around the head, neck, armpits, and groin), or soak employee's clothing with cool water
- circulate the air around the worker to speed cooling

This condition must be treated as a medical emergency and the employee must receive immediate medical attention.

Heat-Related Illnesses: Prevention

While heat related illness are dangerous and potentially life threatening, they can be prevented. Prevention methods include: installing engineering controls, following safe practices, acclimation to high-heat conditions, employee training, hydration, and establishing work-rest period.

Engineering Controls

If possible, the best way to prevent heat-related illness is to make the work environment cooler, which can be achieved by:

- using air conditioning
- increasing air velocity/ventilation
 - manually through forced ventilation (fans) or passively by opening windows or doors
- using reflective or heat-absorbing shielding or barriers
- reducing steam leaks, wet floors, or humidity

Safe Work Practices

If engineering controls cannot be utilized, the following work practices should be enforced:

- limit time spent in hot environments or increase recovery time spend in cool environments
- reduce the metabolic demands of a job
 - use special tools intended to minimize manual strain
- increase the number of workers per task
- implement a buddy system where workers observe each other for signs of heat stress

- immediately reporting signs of heat stress to supervisors
- provide adequate amount of cool, potable water near the work area and encourage workers to drink frequently
- implement a heat alert program whenever the weather service forecasts that a heat wave is likely to occur
- consider scheduling the hottest/most strenuous work for the coolest part of the day

Acclimatization

Acclimation is a process by which the physical processes of an employee's body adjusts to the environment over a period of time after gradual increased exposure. Employees who are not adequately acclimatized to the heat may experience temporary heat fatigue resulting in a decline in performance, coordination or alertness. They may also become irritable or depressed. This can be prevented through gradual adjustment to the hot environment.

To help acclimatize employees to hot work environments, remember:

- it is best to gradually increase workers' time in hot conditions over 7-14 days
- non-physically fit workers require more time to fully acclimatize
- workers in good physical condition tend to acclimatize better because their cardiovascular systems respond better
- acclimatization can be maintained for a few days of non-heat exposure
- taking breaks in air conditioning will not affect acclimatization

Hydration

Supervisors should provide means for appropriate hydration of workers, which include the following requirements:

- water should be potable, and made accessible near the work area
- estimate how much water will be needed and decide who will obtain and check on water supplies
- individual, not communal, drinking cups must be provided
- encourage workers to hydrate themselves

Electrolyte replacement drink additives are an effective PPE measure that can be used to supplement hydration. Information on supplying these products can be obtained by contacting FM-OHS.

Workers should do the following in order to stay hydrated:

- if in the heat < 2 hours and involved in moderate work activities, drink 1 cup of water every 15-20 minutes
- during prolonged sweating lasting several hours, drink sports drinks containing balanced electrolytes
- avoid alcohol and drinks with high caffeine or sugar

Under most circumstances, fluid intake should NOT exceed 6 cups per hour or 12 quarts per day. This makes it particularly important to reduce work rates, reschedule work, or enforce work-rest schedules.

Work-Rest Periods

Supervisors shall ensure and encourage workers to take appropriate rest breaks to cool down and hydrate, which include the following requirements:

- permit rest and water breaks when a worker feels heat discomfort
- modify work-rest periods to give the body a chance to get rid of excess heat
- assign new and unacclimatized workers lighter work and longer, more frequent rest periods

- shorten work periods and increase rest periods:
 - as temperature, humidity, and sunshine increase
 - when there is no air movement
 - if protective clothing or equipment is worn
 - for heavier work

Heat Index

The Heat Index is a single numeric value that uses both temperature and humidity to inform the public on how outdoors temperatures feels, and is often referred to as “apparent temperature.” The higher the Heat Index, the hotter the weather feels. It is a useful guide for employers/employees making decisions about protecting employees in hot weather. However, it does not account for certain conditions that contribute additional risk, such as physical exertion.

OSHA has used the Heat Index to assign protective measures for workers as the Heat Index increases. These protective measures may reduce the likelihood of heat related illnesses, and can be found in Appendix C. Consider taking the steps at the next highest risk level to protect employees from the added risks posed by working in the direct sun (which can add up to 15°F to the heat index value), or wearing heavy clothing or protective gear.

Cold-Related Illnesses: Symptoms and Treatment

During cold weather, an employee’s body will use energy to maintain a normal internal body temperature. This will result in a shift of blood flow from employee’s extremities (hands, feet and legs) and outer skin to the employee’s core (chest and abdomen). If this happens, cold-related illnesses and injuries may occur if exposed to cold conditions for an extended period of time. The most common health problems caused by cold work environments include the follow:

Dehydration

It is easy to become dehydrated during cold weather, because preventive measures are usually associated with hot weather conditions only. Symptoms and treatment of dehydration in cold weather are similar, and should also be observed when working in cold weather.

Chilblains

Chilblains are caused by repeated exposure of skin to temperatures just above freezing to as high as 60° F. Cold exposure causes permanent damage to blood vessels in the skin, and is associated with redness and itching, which will return with additional exposure to cold. The redness and itching typically occurs on cheeks, ears, fingers, and toes.

Symptoms:

- reddening of the skin
- itching
- blistering
- inflammation
- ulceration in severe cases

Treatment:

- avoid scratching
- slowly warm the skin
- use corticosteroid creams to relieve itching and swelling
- keep blisters and ulcers clean and covered

Trench Foot

Trench Foot is caused by having feet exposed to damp, unsanitary, and cold conditions including water at temperatures above freezing for long periods of time. It is similar to frostbite, but considered less severe.

Symptoms:

- reddening of the skin
- numbness
- leg cramps
- swelling
- tingling pain
- blisters or ulcers
- bleeding under the skin
- gangrene (the foot may turn dark purple, blue, or gray)

Treatment:

- remove shoes and socks
- dry employee's feet
- avoid walking on feet (may cause tissue damage)
- seek medical attention

Frostbite

Frostbite occurs when the skin freezes and loses water. In severe cases, amputation of the frostbitten area may be required. While frostbite usually occurs when the temperatures are 30° F or lower, wind chill factors can allow frostbite to occur in above freezing temperatures. Frostbite typically affects the extremities, particularly the feet and hands.

Symptoms:

- reduced blood flow to hands and feet
- numbness
- tingling or stinging
- aching
- bluish or pail, waxy skin

Treatment:

- get into a warm room as soon as possible
- unless absolutely necessary, do not walk on frostbitten feet or toes (increases tissue damage)
- immerse the affected area in warm water (not hot)
- do not rub or massage the frostbitten area (increases tissue damage)
- do not use a heating pad, heat lamp, or heat from a stove, fireplace, or radiator (areas are numb and can easily be burned)
- seek medical attention

Hypothermia

Hypothermia occurs when body heat is lost faster than it can be replaced, and is a potentially serious health concern. When the core body temperature drops to approximately 95°F, the onset of symptoms normally begins.

Early Symptoms:

- shivering
- fatigue
- loss of coordination
- confusion and disorientation

Late Symptoms:

- no shivering
- blue skin
- dilated pupils
- slowed pulse and breathing
- loss of consciousness

As the body temperature continues to fall these symptoms will worsen and shivering will stop. Once the body temperature falls to around 85°F severe hypothermia will develop and the person may become unconscious, and at 78°F, vital organs may begin to fail.

Treatment:

- alert supervisor and request medical assistance
- move employee into a warm room or shelter
- remove wet clothing and replace with dry clothing or a blanket
- warm the center of their body first (chest, neck, head, and groin), using an electric blanket, if available
- warm beverages may help increase the body temperature
- after the body temperature has increased, keep the victim dry and wrapped in a warm blanket, including the head and neck

Cold-Related Illnesses: Prevention

Just as with heat related illness, cold related illnesses and injuries are dangerous and potentially life threatening, however, they can be prevented. Prevention methods include:

Engineering Controls

For employees working indoors, the best way to prevent cold-related illness is to make the work environment warmer. If possible, the best way to prevent cold-related illness is to make the work environment warmer, which can be achieved by:

- using heaters to warm the work area
- if available, use wind barricades to block the wind from employees
- decrease general ventilation by closing windows or doors, only if ventilation is not required for the presence of respiratory hazards

Safe Work Practices

If engineering controls cannot be utilized, the following work practices should be enforced:

- take scheduled breaks in warm areas
- ensure there is plenty of water to drink and take water breaks as needed
- supervisors should consider scheduling the most work for the warmest part of the day
- assign extra employees to high demand tasks that require longer periods in cold areas
- all employee should watch out for the safety of their co-worker

Acclimatization

Similar to acclimatization in hot weather conditions, employees can follow the same procedure for acclimating to cold weather conditions. See methods of weather acclimation in the **Heat-Related Illnesses: Prevention** section of this program.

Personal Protective Equipment (PPE)

PPE is an important factor in preventing cold stress related illnesses and injuries. Employees should adhere to the following recommendations when dressing for work in a cold environment:

- wear several layers of loose clothing
 - layering provides better insulation
 - tight clothing reduces blood circulation
- wear a hat or hood
 - up to 40% of body heat can be lost when the head is left exposed

- protect the ears, face, hands, and feet
- wear insulated boots or other footwear
- keep a change of clothing available in case work clothes become wet

Employees who are expected to perform work outdoors in cold weather conditions shall be issued clothing for protection from cold-related illnesses. FM-issued clothing shall be considered a primary means of cold stress prevention which employees are expected to use if issued.

- Employees performing snow duty shall be issued high-visibility 3-in-1 (jacket, fleece, bib) clothing for conducting work near vehicle traffic
- Employees performing work outdoors in cold weather conditions routinely shall be issued insulated outer work wear, which may include water resistant, ducked hooded jackets and bibs

Hand and foot warming packets are an effective PPE measure that can be used to supplement reducing cold exposure. Employees that use hand and foot warming packets must follow manufacturer's instructions on their usage. Information on supplying these products can be obtained by contacting FM-OHS, or by referencing the Preferred PPE on the FM-OHS website.

The Cold Stress Equation

OSHA has incorporated information obtained from the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values into the Cold Stress Equation. As the temperature decreases and/or the wind speed increases, the potential for cold stress related illnesses and injuries increases. The Cold Stress Equation can be reference to identify when weather conditions pose a higher risk to employees, and is available in Appendix B.

Training

Supervisors shall ensure all employees have received Heat and/or Cold Stress training prior to working in such conditions.

Employers shall make heat/cold stress training programs available for all workers and supervisors, covering:

- recognition of the symptoms of heat/cold-related illnesses and administration of treatment
- causes of heat/cold-related illnesses and the procedures that will minimize the risk, such as drinking enough water and monitoring the color and amount of urine output
- proper care and use of heat/cold-protective clothing and equipment and the added heat load cause by exertion, clothing, and personal protective equipment
- effects of non-occupational factors (drugs, alcohol, obesity, etc.) on tolerance to thermal stress
- importance of acclimatization
- importance of immediately reporting signs of heat/cold-related illness to supervisors
- procedures for responding to symptoms of possible heat/cold-related illness and for contacting emergency medical services

In addition to the above training elements, supervisors' training should also cover:

- how to implement appropriate acclimatization
- what procedures to follow when a worker has symptoms consistent with heat/cold-related illness, including emergency response procedures
- how to monitor weather reports and respond to hot/cold weather advisories
- how to monitor and encourage adequate fluid intake and rest breaks

FM-OHS can provide heat or cold stress training upon request.

Monitoring

Upon request, FM-OHS can provide monitoring of workplace environmental conditions, providing supervisors and employees with information to select appropriate protective measures for working in temperature extremes. Employees are encouraged to reference the guides located in the appendix of this program, listing weather conditions to determine respective hazards.

Recordkeeping

FM-OHS maintains Temperature Extremes Program records, including training materials and attendance, annual program evaluation records, and a current copy of the written Temperature Extremes Program.

Program Evaluation

FM-OHS will evaluate the Temperature Extremes Program to include this Temperature Extremes Program annually for continued program effectiveness and compliance with applicable regulations and industry standards.

Appendix-A

Heat-Related Illnesses

Illness	Symptoms	First Aid
Heat Stroke	<ul style="list-style-type: none"> • Confusion • Fainting • Seizures • Excessive sweating • Red, hot, dry skin • Very high body temperature 	<ul style="list-style-type: none"> • Call 911 While waiting for help: <ul style="list-style-type: none"> • Place worker in shady, cool area • Loosen clothing, remove outer clothing • Fan air on worker; cold packs in armpits • Wet worker with cool water; apply ice packs, cool compresses, or ice if available • 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 or light headedness • Weakness • Thirst • Irritability • Fast heart rate 	<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 or ice packs • Take to clinic or emergency room for medical evaluation or treatment if signs or symptoms worsen or do not improve within 60 minutes • Do not return to work that day
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
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 when possible • Keep the affected area dry

Reference: Occupational Safety & Health Administration

Appendix-B

Heat Index

		Temperature (°F)															
		80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
Relative Humidity (%)	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	-	-	-	-	-	-	-	-	-	-	
Heat Index		Risk Level		Protective Measures													
				<ul style="list-style-type: none"> • Provide plenty of drinking water • Ensure that adequate medical services are available • Plan ahead for times when heat index is higher, including worker heat safety training • Encourage workers to wear sunscreen • If workers must wear heavy protective clothing, perform strenuous activity, or work in the direct sun, additional precautions are recommended to protect workers from heat related illness 													
				In addition to the steps listed above: <ul style="list-style-type: none"> • Remind workers to drink water often (4 cups per hour) • Review heat related illness topics with workers such as recognition, prevention, and first-aid • Schedule frequent breaks in cool, shaded areas • Acclimatize workers • Set up a buddy system and instruct workers and supervisors to watch for signs of heat related illnesses • Schedule strenuous activities at a time when the heat index is lower • Develop work-rest schedules • Monitor workers closely • If workers must wear heavy protective clothing, perform strenuous activity, or work in the direct sun, additional precautions are recommended to protect workers from heat related illness 													
				In addition to the steps listed above: <ul style="list-style-type: none"> • Alert workers of high risk conditions • Actively encourage workers to drink plenty of water (about 4 cups per hour) • Limit physical exertion • Have a knowledgeable person at the work site who is well informed about heat related illness and able to determine appropriate work-rest schedules • Establish and enforce work-rest schedules • Adjust work activities (e.g. reschedule work, pace/rotate jobs) • Use cooling techniques • Watch/communicate with workers at all times • When possible, reschedule activities to a time when the heat index is lower 													
				If essential work must be done, in addition to the steps listed above: <ul style="list-style-type: none"> • Alert workers of extreme heat hazards • Establish water drinking schedule (about 4 cups per hour) • Develop and enforce protective work-rest schedules • Conduct physiological monitoring (e.g. pulse, temperature, etc.) • Stop work if essential control methods are inadequate or unavailable • Reschedule non-essential activities for days with a reduced heat index or to a time when the heat index is lower • Move essential work tasks to the coolest part of the work shift • Consider earlier start times, split shifts, or evening/night shifts • Strenuous work tasks and those requiring the use of heavy or non-breathable clothing or impermeable chemical protective clothing should not be conducted when the heat index is at or above 115° F 													

Reference: NOAA's National Weather Service Heat Index, Occupational Safety & Health Administration

Appendix-C

The Cold Stress Equation

LOW TEMPERATURE + WIND SPEED + WETNESS = INJURIES

When the body is unable to warm itself, serious cold-related illnesses and injuries may occur, and permanent tissue damage and death may result. The table below indicates the combined temperature and wind conditions, and its expected effect on the body.

Wind Chill Chart

		Temperature (°F)																	
		40°	35°	30°	25°	20°	15°	10°	5°	0°	-5°	-10°	-15°	-20°	-25°	-30°	-35°	-40°	-45°
Wind (MPH)	5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
	10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
	15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
	20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
	25	29	23	16	9	3	-4	-1	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
	30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
	35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
	40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
	45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
	50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
	55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
	60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times	30 minutes	10 minutes	5 minutes
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Reference: NOAA's National Weather Service Wind Chill Chart