Greenville County Schools

Guide for Outdoor Practices in High Temperatures and Humidity

Guidelines adopted from the National Athletic Trainers Association (NATA) and the Virginia High School League

HEAT INJURIES CAUSE MULTIPLE DEATHS EACH YEAR IN HIGH SCHOOL SPORTS.

Heat illness and injury can range from a simple muscle cramp to life threatening heat stroke. Catastrophic heat injuries are preventable. Following the recommendations found in this document, the risk of heat injuries can be reduced significantly. The most important components in preventing heat injury are the prevention of dehydration and limiting activity when temperature and humidity make it near impossible for the body to cool through evaporation of sweat.

The body produces heat at rest. This heat production increases 10 to 20 times with exercise. Evaporation is the major method of cooling the body during exercise. Evaporation of sweat dissipates the heat from the core of the body, keeping the internal organs cool. Exercising in a dehydrated state reduces the ability to sweat, therefore compromising the ability to cool. Dehydration also causes a reduction in blood volume, compromising cardiac output. The air temperature and humidity have a direct effect on the efficiency of this cooling process. Based on the effects of dehydration and exercising in the heat and humidity, the following guidelines have been established to provide administrators, coaches, and athletic training staff, with a sound plan to prevent heat injury.

It is strongly recommended that each school system develops and adheres to specific heat guidelines appropriate for their student activity population and facilities based on scientific research. Guidelines should also apply to activities such as marching band and for gyms and indoor facilities without air conditioning.

Signs and Symptoms of Heat Problems:

The following are common signs and symptoms related to heat illness, but are not intended to represent a complete list. In the event an athlete is suffering from one or more of the following, the athlete should be referred to appropriate allied health care or medical professional for full evaluation.

- Muscle spasms/cramps
- Heavy or profuse sweating
- Skin is flushed or cool and pale
- Headache
- Dizziness
- Rapid pulse, nausea, weakness
- Disoriented, confusion
- Elevated body core temperature
- Cessation of sweating
- Red, dry skin
- Shallow breathing and rapid pulse
- Loss of consciousness

Heat Illness/Injury Facts:

- Adolescents take longer to acclimatize to the heat than adults
- Dehydration of 1% to 2% of body weight begins to impact athletic performance
- Dehydration greater than 3% of body weight significantly increases the risk of heat related illness.
- 1.5 times the amount of water lost must be consumed to replace lost weight.
- Unrelated illnesses causing vomiting and/or diarrhea will increase risk of heat related illnesses. These conditions should be brought to the attention of the ATC and/or coaching staff prior to participation and close monitoring of these individuals should take place during practice sessions and competition.
- Athletes taking certain medications including diuretics, antihistamines, beta blockers and anti-cholinergics are at higher risk for heat illnesses. Common medications among teens such as Ritalin and Aderal are within these high risk categories.
- Wear light weight and light colored clothing. Light colored breathable clothing can assist the body in cooling.
- Athletes who are overweight, poorly conditioned, recovering from illness, lacking in sleep, or taking medications are at added risk for heat illnesses and should be monitored closely and/or have their participation level modified.
- Sports drinks should contain less than 8% carbohydrates (check label!). Carbohydrate content greater than 8% compromises the rate of gastric emptying and should be avoided.
- Early morning commonly produces a humid environment and lower temperatures. Usually, as the sun rises, the temperature will increase and the humidity decreases. As the evening hours approach, the temperature decreases and the humidity will rise. Often, the most critical times to monitor athletes' ability to exercise in hot weather occurs when the temperature rises quickly during the early morning prior to the sun burning off the humidity, or during storms when the humidity remains high due to cloud cover, etc.
- A mild breeze can reduce the humidity on a particular field, as well as improve the evaporative process.
- Field watering after practice sessions are complete can help reduce the ambient humidity on or near an athletic field, thus reducing the heat stress on athletes.

Environmental factors:

Ambient air temperature and humidity have a direct effect on the ability for a body to cool itself through the evaporation of sweat. When the air temperature is above 90, and/or the relative humidity is high, the body is at a higher risk to not effectively stay cool, which may be compounded by the level of dehydration of the body's fluids.

Recommendations for Fluid Replacement:

- All schools should establish a Fluid Replacement Protocol for their facility and programs. (see recommendations below)
- All athletes should inform their coaches and/or athletic training staff of any pre-existing heat illness, gastro-intestinal condition and/or medical complication prior to exercising in the heat.
- Weigh athletes before and after each practice during hot weather. Athletes should conform to a restricted activity schedule if not within 1% of the previous day's PRE-EXERCISE weight.
- Replace fluids at a rate of 24 fluid ounces for every pound of body weight lost after exercise
- Athletes should be educated in the process of hydrating themselves as a 24 hour a day process.
- Athletes should begin every athletic activity well hydrated. **We suggest drinking plenty of water as they arrive to get ready for practice and before they go onto the field or court.**
- During exercise, the average person should drink 8 – 12 oz of fluid every 20 to 30 minutes.
- Urine color is an easy method to determine hydration status. Light yellow to clear urine indicates a well-hydrated athlete.
- Water should be available to athletes at all times and never be withheld from exercising individuals.

Fluid replacement should be at a rate of 24 oz for every pound of body weight lost after exercise.

- Light colored, loose clothing is suggested during activity in hot weather.
- Adequate fluid supply should be readily available at all times during activity in hot weather.
- **Individuals poorly acclimatized (especially those who come out for a team after the 1st week)**, or poorly conditioned are at increased risk for heat related illness/injury and should be monitored closely or placed on a modified participation schedule.
- **Athletes having a pre-existing dehydrated state or on medications** (recent fever or gastro-intestinal illness) or pre-existing heat injury are at a much higher risk for heat related illness/injury and should be monitored closely or placed on a modified participation schedule.
- **Medications including Ritalin, Aderal, diuretics, antihistamines, beta blockers and anti-cholinergics increase the risk of heat illness/injury.**
- **Overweight athletes** are at increased risk for heat illness/injury and should be monitored closely.
- Energy, ergogenic, and dietary supplements such as Creatine may cause an increase in dehydration and heat related illness and/or injury.

National Athletic Trainers Association's (NATA) Recommendations on Fluid Replacement:

- Educate athletes on the effects of dehydration on physical performance.
- Inform athletes on how to monitor hydration status.
- Convince athletes to participate in their own hydration protocols based on sweat rate, drinking preferences, and personal responses to different fluid quantities.
- Encourage coaches to mandate rehydration during practices and competitions, just as they require other drills and conditioning activities.
- Have a scale accessible to assist athletes in monitoring weight before, during, and after activity.
- Provide the optimal oral rehydration solution (water, CHOs, electrolytes) before, during, and after exercise.
- Implement the hydration protocol during all practices and games, and adapt it as needed.
- Finally, encourage event scheduling and rule modifications to minimize the risks associated with exercise in the heat.

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Full text can be found on NATA's website: www.nata.org

Acclimatization to Heat:

Another way to help prevent heat stress is to become acclimatized to the weather. Acclimatization means becoming adapted to the weather or climate. The process takes 7 to 12 days. Studies have shown adolescents take longer to acclimatize to heat than adults. As a result of acclimatization, the sweating mechanism of a person is enhanced:

- onset of perspiration occurs earlier
- perspiration increases
- increase in blood volume with the more training an individual does
- improves supply of oxygen to the muscles
- heart rate decreases
- core body temperature does not rise as high during exercise

HUMITURE CHART

for Schools and Persons that do NOT have access to psychrometers

The following chart is a simple method to determine the amount of increased risk with variations of heat and humidity, and subsequent suggestions to modify participation in physical activities. **This chart is to be used when there is no mechanical (sling) or digital psychrometer available.** This chart can be used by inputting the temperature and humidity available via local radio stations, Internet locations, etc. Simply cross-reference the relative humidity (top row) with the temperature (first column) to determine the **humiture**. Follow guidelines outlined below.

Humiture or Apparent Temperature Chart (After R.G.Steadman, 1979)

RELATIVE HUMIDITY (%)

Temp ↓	**10%**	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	**90%**	**100%**
105º	**100**	**105**	**113**	**123**	**135**	**149**				
104º	**98**	**104**	**110**	**120**	**132**	**143**				
102º-103º	**97**	**101**	**108**	**117**	**125**	**139**				
100º-101º	**95**	**99**	**105**	**110**	**120**	**132**	**144**			
98º-99º	**93**	**97**	**101**	**106**	**110**	**125**	**132**			
96º-97º	**91**	**95**	**98**	**104**	**108**	**120**	**128**			
94º-95º	89	**93**	**95**	**100**	**105**	**111**	**122**	**128**		
92º-93º	87	**90**	**92**	**96**	**100**	**106**	**115**	**122**		
90º-91º	85	88	**90**	**92**	**93**	**100**	**106**	**114**	**122**	**130**
88º-89º	82	86	87	89	**93**	**95**	**100**	**106**	**115**	**125**
86º-87º	80	84	85	87	**90**	**92**	**96**	**100**	**109**	**111**
84º-85º	78	81	83	85	86	89	**91**	**95**	**99**	**105**
82º-83º	77	79	80	81	84	86	89	**91**	**95**	**96**
80º-81º	75	77	78	79	81	83	85	86	89	**91**
78º-79º	72	75	77	78	79	80	81	83	85	86
76º	70	72	75	76	77	77	77	78	79	80

HUMITURE — **GREENVILLE COUNTY SCHOOLS REGULATIONS**

105º and up (Red blocked areas/white #s): …….. No outside activities *

95º to 104º (Yellow blocked areas):……... No equipment (helmets, pads, etc) be used during activity.

90º to 94º (Blue blocked areas):……Equipment to be removed as often as possible (during rest breaks, on sideline, etc.). Careful monitoring of all athletes for signs of heat problems.

Below 89º (Clear or white blocked areas): …….. Adequate water supply at all practices and competitions with breaks every 20 to 30 minutes for rehydration.

* NOTE: Also applies to indoor activities held in non-air conditioned facilities.

WET BULB TEMPERATURE (WBT) / HEAT INDEX CHART

For **athletic practices** at schools that have **sling or digital psychrometers**,
Schools are to use the below method of assessing adverse heat conditions

NOTE: The "Heat Index" is computed by adding the Wet Bulb Temperature (taken by the psychrometer) to the ambient (dry bulb) temperature and then dividing by two. It should be noted that wet bulb readings represent the temperature including the effect of evaporative cooling. These readings are more commonly acquired using a **sling psychrometer** (available through medical suppliers for under $40) **or digital psychrometer** (for under $100). The use of these devices allows for more accurate monitoring of actual conditions found at an athletic facility.

HEAT INDEX		Recommended Duration of Practice	Attire	Fluid Consumption	Regulations
1st Two Weeks	3rd Week and after				
81.9 & Below	**82.9 & Below**	No Precautions* 3 hours maximum	Full gear	Insist that adequate fluid be ingested	Never restrict water consumption
82 to 85.9	**83 to 86.9**	No Precautions* 3 hours maximum	Full gear permissible, However, **helmets off if not in an active drill**	Insist that 6 – 8 oz. minimum water be ingested every 20 minutes. Suggest you have a watering station available for small groups to use at will for this purpose. For a full two hour practice, we recommend at least two full water breaks** in addition to the watering stations.	**Remove helmet unless active in drill.** Breaks in shade if possible. Minimum 5 minute breaks
86 to 86.9	**87 to 87.9**	Reduce your practice time to under two hours if possible. To do this, suggest you shorten periods by 3-5 minutes each.*	**Helmets and shoulder pads off!**	Insist that 8 – 10 oz water be ingested every 15 minutes. Suggest you have a watering station available for small groups to use at will for this purpose. For a full two hour practice, we recommend at least two full water breaks** in addition to the watering stations.	**Helmets and shoulder pads off!** Shorten practice times by shortening each period 3-5 minutes.
87 and Above	**88 and Above**	**NO PRACTICE OUTSIDE**. Suggest you move your practice times either to an earlier hour in the morning or to a later hour in the afternoon. Practice inside is permitted. However, heat guidelines must still be followed unless your venue inside is air-conditioned.			

* Should the heat index change during practice by moving upward to a more serious zone, then immediately follow the guidelines prescribed for the more serious zone. Should the heat index move downward during practice to a less serious zone, then coaches may adapt immediately to the lesser zone by eliminating the prescribed precautions and/or lengthening practice. However, since players were already exposed to the more serious zone, coaches and trainers should continue increased fluid ingestion and close monitoring of the athletes.

** A "Full Water Break" means that cups (9 oz. or greater) of water (preferably with ice) are provided and players have access to and are allowed to refill their cups at least one or multiple additional times. If cups are not available, a watering station with multiple drinking stations should be used with athletes allowed multiple visits during the break.