

VERMONT PRINCIPALS' ASSOCIATION

Procedure for Athletic Participation in the HEAT

Exercise in a hot environment with associated fluid loss and elevated body temperature can lead to: Dehydration, Heat Exhaustion, Exertional Heat Stroke and Death.

Modifications MUST be made if the environment is putting athletes at greater risk for heat illness.

All schools are expected to adhere to the following policy for athletic participation in all sports during times of high heat and/or humidity.

Exertional Heat Stroke is on the rise in this country, and is currently among the top three reasons why athletes die during sporting activities. Vermont Principals' Association mandatory procedure for athletic activity in the heat provides critical standards to protect athletes against heat illnesses, and potentially save lives.

This procedure follows recommended guidelines from the National Athletic Trainers' Association, American College of Sports Medicine, and the Korey Stringer Institute.

STEPS FOR MONITORING HOT WEATHER:

- Weather should be monitored by designated athletic department personnel (Athletic Trainer if present) and an advisory should be issued to school coaching staff when applicable. Usually by email **the day prior** to the event warning of the potential, and **the day of the** event with any modifications for participation.
- Athletic Department officials should use a **Wet Bulb Globe Temperature** Measuring (WBGT) Device. It is considered the gold standard measurement tool.
 - (if cost prohibitive, Heat Index measuring devices can be used, although considered less accurate than WBGT)
 - The WBGT considers ambient temperature, relative humidity, wind, and solar radiation.
 - The Heat Index considers effects of ambient temperature and relative humidity only.
 - WBGT can be estimated from the chart below (**Chart 1**) in cases where there is full sun and light wind by using a heat index monitor.
 - There is a WBGT app for iOS or Android called WeatherFX, to estimate WBGT.
 - A list of potential devices to be used for measurement can be found on pg.5.
- Weather readings **MUST** be measured **at the practice/game site**, using a WBGT Device (or Heat Index Monitor). Measurements should be obtained beginning at least 1 hour prior to the event/warmups and monitored every 30 minutes thereafter if in the moderate to extreme risk category.
- Reminder: Synthetic Turf/Asphalt/Dark colored surfaces are significantly hotter than the ambient air temperature, especially if in full sun.
- Based on information from local/on-site weather measurements and from the National Weather Service, determine the risk of potential danger to participants using **Table 1 below**. Issue a warning and implement the practice or game plan for that day to be distributed to all coaches prior to practice/game time. **See list on pg. 3 for additional Competition Modifications.**
- Avoid scheduling training and competitions during the hottest part of the day (between 11am and 4pm).
- Shaded Areas should be easily accessible to athletes during rest/fluid breaks with unlimited fluids available

Activity Modification Chart Table 1 Regional Category 1 Guidelines-Grundstein

RISK	WBGT*	MODIFICATIONS#
Minimal Risk	≤ 76.1°F	<i>Normal Activities, no modifications necessary</i>
Low Risk	76.2 - 81°F	<i>Normal Activities/Regular practice/game prep</i> Discretion for Intense/Prolonged Activity; Watch at Risk Players Provide at least 3 rest/fluid breaks each hour of 4+mins each.
Moderate Risk	81.1 - 84°F	<i>Rest/Work ratio to be increased;</i> 15-20 min of activity followed by 4+ min rest/fluid breaks; Practice will be in shorts, helmets, shoulder pads only No equipment may be worn for conditioning activities Maximum length of practice 2 hours
High Risk	84.1 - 86°F	<i>Rest/Work ratio to be increased; 20 mins activity/6+ min rest</i> 20 mins of rest distributed throughout 1 hr of practice Practice will be in shorts only (all protective equipment removed) No conditioning activities Maximum Length of practice 1 hour Change Time of Day activity is held (no practices b/t 11am-4pm)
Extreme Risk	≥ 86.1°F	<i>No Outdoor Workouts</i> May delay practice until cooler WBGT reading occurs

Shaded Areas should be made available for all athletes during rest/fluid breaks, unlimited fluids, remove equipment

Reminder: the temperatures shown in the above table are WBGT temps, not ambient temperatures

*Cat 1 from Grundstein

#Adapted from: Andrew Grundstein, Applied Geography, 2015
Regional Safety Thresholds for athletics in the Contiguous US

Chart 1

Wet Bulb Globe Temperature (WBGT) from Temperature and Relative Humidity																																
Temperature in Degrees Fahrenheit																																
	68.0	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2	104.0	105.8	107.6	109.4	111.2	113.0	114.8	116.6	118.4	120.2	122.0	
0	59.0	60.8	60.8	62.6	64.4	64.4	66.2	66.2	68.0	68.0	69.8	71.6	71.6	73.4	73.4	75.2	75.2	77.0	77.0	78.8	80.6	80.6	82.4	82.4	84.2	84.2	86.0	87.8	87.8	89.6	89.6	
5	60.8	60.8	62.6	64.4	64.4	66.2	66.2	68.0	69.8	69.8	71.6	71.6	73.4	75.2	75.2	77.0	78.8	78.8	80.6	80.6	82.4	84.2	84.2	86.0	86.0	87.8	87.8	89.6	91.4	91.4	93.2	95.0
10	60.8	62.6	62.6	64.4	66.2	66.2	68.0	69.8	69.8	71.6	73.4	73.4	75.2	77.0	77.0	78.8	80.6	80.6	82.4	84.2	84.2	86.0	87.8	89.6	89.6	91.4	93.2	95.0	96.8	96.8	98.6	
15	62.6	62.6	64.4	66.2	66.2	68.0	69.8	69.8	71.6	73.4	73.4	75.2	77.0	78.8	78.8	80.6	82.4	84.2	84.2	86.0	87.8	89.6	91.4	91.4	93.2	95.0	96.8	98.6	100.4	102.2		
20	62.6	64.4	64.4	66.2	68.0	68.0	69.8	69.8	71.6	73.4	75.2	75.2	77.0	78.8	80.6	80.6	82.4	84.2	86.0	87.8	89.6	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2			
25	64.4	64.4	66.2	68.0	68.0	69.8	71.6	73.4	75.2	75.2	77.0	78.8	80.6	82.4	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2						
30	64.4	66.2	68.0	68.0	69.8	71.6	73.4	73.4	75.2	77.0	78.8	80.6	82.4	84.2	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	102.2								
35	64.4	66.2	68.0	69.8	71.6	73.4	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2									
40	66.2	68.0	69.8	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2										
45	66.2	68.0	69.8	71.6	73.4	75.2	77.0	78.8	80.6	80.6	82.4	84.2	86.0	89.6	91.4	93.2	95.0	96.8	98.6	100.4												
50	68.0	69.8	71.6	73.4	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	91.4	93.2	95.0	96.8	98.6	102.2													
55	68.0	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	93.2	95.0	96.8	98.6	100.4														
60	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	95.0	96.8	98.6	100.4															
65	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	87.8	89.6	91.4	93.2	96.8	98.6	100.4																
70	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	91.4	93.2	95.0	96.8	100.4	102.2																
75	71.6	73.4	75.2	77.0	78.8	80.6	84.2	86.0	87.8	89.6	91.4	95.0	96.8	98.6	102.2																	
80	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	89.6	91.4	93.2	96.8	98.6	100.4																		
85	73.4	75.2	77.0	78.8	82.4	84.2	86.0	87.8	89.6	93.2	95.0	98.6	100.4	102.2																		
90	75.2	77.0	78.8	80.6	82.4	84.2	87.8	89.6	91.4	95.0	96.8	98.6	102.2																			
95	75.2	77.0	78.8	80.6	84.2	86.0	87.8	91.4	93.2	95.0	98.6	100.4																				
100	75.2	78.8	80.6	82.4	84.2	87.8	89.6	91.4	95.0	96.8	100.4	102.2																				

NOTE: This table is compiled from an approximat formula which only depends on temperature and humidity. The formula is valid for full sunshine and a light wind. Table adapted from Bureau of Meteorology

Step 1: If you DO NOT have a WBGT measuring device, measure the temperature and humidity so you can estimate the WBGT using **Chart 1** above.

Note: This is only accurate in light wind and full sun conditions.

Step 2: Once you have determined an Estimated WBGT, use **Table 1** above to see what activity modifications should be implemented.

VERMONT PRINCIPALS' ASSOCIATION

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Recommended Preventative Strategies for Competitions:

Competition Modifications:

- Unlimited supply of water at the site of each activity
- Move competition times to a cooler part of the day; early morning or early evening
- Meet with officials prior to game to discuss any or all of the concerns and/or strategies.
- Use player substitutions more often during play
- A mandatory water time out at the mid-way point of each half of play for both teams
- Extended halftime for players to recover/cool more completely, allow for teams to go to shaded areas
- Cold water/ice towels and/or fans should be used to cool players
- Recommend removal of helmets and other equipment during rest periods or stoppage of play.
- Have plenty of extra ice and water at the site in the event a player needs immediate first aid/cooling
 - An on-site cold/ice water tub (kiddie pool) for emergent athlete immersion is recommended
- Athletic Trainers/Coaches should be especially vigilant and monitor player's physical condition in extreme temperatures

Hydration:

- Allow athletes unlimited access to water during practice/competition
- Keep in mind individual fluid needs vary. Each athlete should determine their own individual need.
- Ensure an unlimited supply of water at the site of activity
- As the heat risk category increases, an increase in the number and duration of hydration breaks should be implemented, along with shortening practice time.

Clothing:

It is essential that everyone is made aware of the importance of:

- Wearing appropriate clothing during play (wear light colors, wicking quick dry fabric)
- How equipment influences one's ability to dissipate heat effectively.
- Appropriate application and re-application of SPF 30+ sunscreen

Factors Affecting Body Temperature Regulation:

- Physical Effort Unmatched to Physical Fitness (Warrior mentality)*
- Increased WBGT*
- Hydration Status/Fluid Intake/Dehydration Greater than 3% body weight loss during the event*
- Sleep*
- Underlying Illness (Fever, Infection)*
- Body Mass Index (larger BMI greater risk)
- Age of Athlete (children/adolescent, elderly)
- Prior History of heat illnesses
- Unacclimatized athletes (early season, unusually high temps)
- Some medications and/or some medical conditions
- Heavy or "Salty Sweaters"
- High Temperature/humidity the previous participation day

*Key Risk factors for heat illness

HEAT ILLNESS

- Exposure to prolonged or abnormal amounts of heat and humidity can be especially dangerous for *young athletes* who sweat less, adjust more slowly and produce more internal heat than adults.
- **Remember: More water does not make it less hot!**
- Exercise in a hot environment, with associated fluid loss and elevated body temperature, can lead to: **Dehydration, Heat Exhaustion and Exertional Heat Stroke (EHS)**. EHS is a preventable, potentially fatal condition and must be treated immediately.
- Children who take certain medications, have chronic health problems or are overweight may be more susceptible to heat illness.

HEAT ILLNESS DEFINITIONS:

Dehydration

- Fluid loss occurs during exercise, due to perspiration and respiration.
- It makes an athlete more susceptible to fatigue and muscle cramps. Inadequate fluid replacement before, during and after exercise will lead to excessive dehydration and may lead to other heat illnesses.

Treatment: Fluid replacement before, during and after activity until urine is a light lemonade color and until the individual has replaced fluid losses within 2% of their pre-exercise body weight.

Heat Exhaustion

- Dehydration can lead to heat exhaustion and an inability to sustain adequate cardiac output.
- Symptoms include:
 - Fatigue, weakness
 - Headache, dizziness
 - Pale, clammy, sweaty skin
 - Loss of endurance/skill
 - Light-headedness
 - Nausea
- Athletes will pass little urine, which will be highly concentrated.
- Muscle cramps may be associated with heat exhaustion

Treatment: Cool athlete in shade or air conditioning, ice towels, remove equipment, elevate legs. Fluid replacement before, during and after activity until urine is a light lemonade color and until the individual has replaced fluid losses within 2% of their pre-exercise body weight.

Exertional Heat Stroke

- Severe overheating, thermoregulatory failure may lead to exertional heat stroke.
- More or Large amounts of water do not prevent heat stroke
- **HEAT STROKE is LIFE THREATENING and PREVENTABLE!**
- Symptoms include:
 - **White skin, may or may not be sweating**
 - **Confusion**
 - **Increased body temperature (> 104°F)**
 - **Increased heart rate, respirations**
 - Fatigue
 - Headache, dizziness
 - Nausea
 - Collapse
- Exertional Heat stroke may arise in an athlete who has **not** been identified as suffering from heat exhaustion and has persisted in further activity.

Treatment: Immediate, drastic on-site cooling in ice/cold water immersion, fans, ice cold wet towels replaced every 2 minutes over the entire body surface; then EMS to hospital after cooling.

COOL FIRST, TRANSPORT SECOND when appropriate medical personnel are present!

INFORMATION ON WET BULB GLOBE TEMPERATURE DEVICES

The VPA is sensitive to directing schools to instruments that are portable and that are within the \$150.00 - \$400.00 price range.

The following list of instruments and web sites that you may find the devices. It is not an exhaustive list – there are other units on the market that are functional and affordable.

<http://kestrelmeters.com/products/kestrel-4400-heat-stress-meter>

Kyoto KEM – WBGT-103 Heat Stroke Checker

<http://kestrelmeters.com/products/kestrel-drop>

www.medco-athletics.com General Reed -- WBGT meter 8778

www.testequipmentdepot.com Reed – SD-2010

www.schoolhealth.com EBGT Model #13099