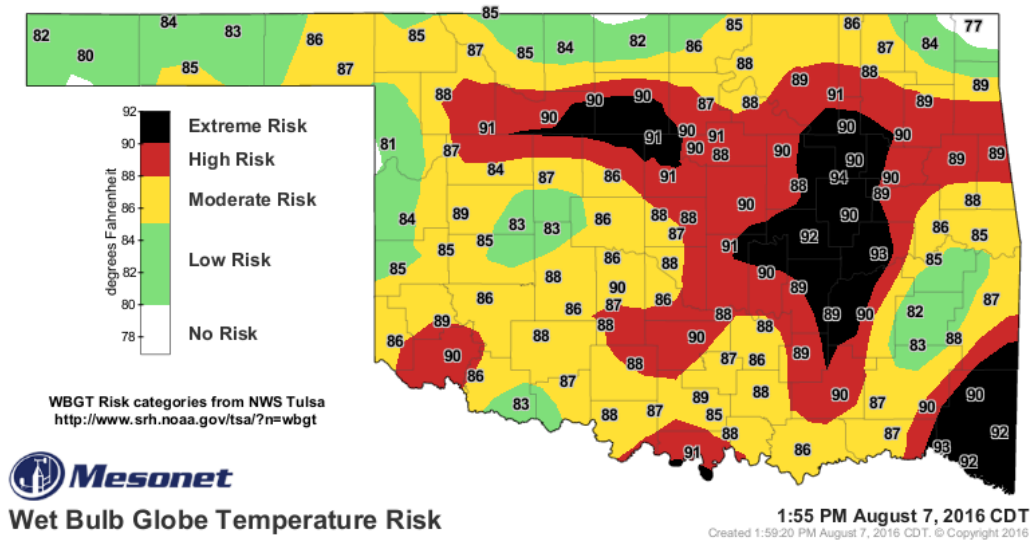


Heat Acclimation and Hydration with Wet Bulb Globe Temperature

08/25/16

WBGT available on mesonet.org and Mesonet mobile apps – under Air Temperature

Wet bulb globe temperature (WBGT) is a comprehensive human heat stress index based on air temperature, relative humidity, wind speed, and sunlight. It was developed to better assess outdoor human heat risk. The traditional "Heat Index" adjusts air temperature only by relative humidity. While the wet bulb globe temperature helps you avoid dangerous heat conditions, it can also be used as a guide to safely acclimate to heat and to better pace your outdoor work or play.



To acclimate to heat, you want to expose yourself to hot conditions, yet avoid heat severe enough to cause exertional heat illness. Acclimating to heat is not just a safety issue, outdoor summer activities will be more enjoyable too. Heat acclimation is a process that is different for each individual. It varies with age, medications, overall health, genetics, and hydration.

Heat acclimation typically takes 5-10 days of heat exposure. Start your acclimation during times when the wet bulb globe temperature is between 80 and 85 WBGT Fahrenheit index. This is the green, Low Risk category in the Wet Bulb Globe Temperature map above. As you become more heat acclimated, shift your heat exposure to times when conditions are in the Moderate Risk category of 86-88 WBGT Fahrenheit index. Stay outdoors to take breaks or rest. Choose a shady spot with good air movement. You are striving for extended periods outdoors. Going in and out of air conditioning does not push the body to acclimate to heat. For unacclimated people, OSHA recommends a 5-day acclimation program starting with 20% of outdoor work time on day 1 and increasing 20% each day¹.

Your heat risk is highly dependent on your hydration level. Even if you have acclimated to heat, adequate hydration is critical to avoid exertional heat illness. The Wet Bulb Globe Temperature Work/Rest Hydration Table on the next page includes water recommendations during outdoor activities. To properly hydrate, drink water or alternate water with a sports drink. Avoid drinks that are high in sugar or contain alcohol. If you experience a lack of focus or thought process, headache, skin flushing, or feel like you have stopped sweating, take a break immediately and drink water. Remove head coverings and extra clothing. If available, use water to cool your face, neck, wrists, and forearms. Placing your hands and forearms in cool water for 5-10 minutes has been shown to be an effective way to cool the body².

Wet Bulb Globe Temperature Work/Rest Hydration Table

Heat Risk Category		Wet Bulb Globe Temp	Light Work		Moderate Work		Heavy Work	
			Work/Rest	Water Intake (quart/hr)	Work/Rest	Water Intake (quart/hr)	Work/Rest	Water Intake (quart/hr)
No Risk	Unacclimated	78 – 79.9	50/10 min	1/2	40/20 min	3/4	30/30 min	3/4
	Acclimated	78 – 79.9	continuous	1/2	continuous	3/4	50/10 min	3/4
Low	Unacclimated	80 – 84.9	40/20 min	1/2	30/30 min	3/4	20/40 min	1
	Acclimated	80 – 84.9	continuous	1/2	50/10 min	3/4	40/20 min	1
Moderate	Unacclimated	85 – 87.9	30/30 min	3/4	20/40 min	3/4	10/50 min	1
	Acclimated	85 – 87.9	continuous	3/4	40/20 min	3/4	30/30 min	1
High	Unacclimated	88 – 90	20/40 min	3/4	10/50 min	3/4	avoid	1
	Acclimated	88 – 90	continuous	3/4	30/30 min	3/4	20/40 min	1
Extreme	Unacclimated	> 90	10/50 min	1	avoid	1	avoid	1
	Acclimated	> 90	50/10 min	1	20/40 min	1	10/50 min	1

Adapted from: 1) USGS Survey Manual, Management of Occupational Heat Stress, Chapter 45, Appendix A. 2) Manual of Naval Preventive Medicine, Chapter 3: Prevention of Heat and Cold Stress Injuries. 3) OSHA Technical Manual Section III: Chapter 4 Heat Stress. 4) National Weather Service Tulsa Forecast Office, Wet Bulb Globe Temperature.

Recommendations in the Wet Bulb Globe Temperature Work/Rest Hydration Table above are for healthy, hydrated humans fully clothed with lightweight summer working clothes. **Add 2 WBGT units** when wearing cotton coveralls. **Add 4 WBGT units** when wearing heavy, winter-type clothing. **Add 6 WBGT units** when wearing water repellent, semi-permeable clothing. When wearing full-body, waterproof, impermeable, protective clothing (e.g. Tyvek coveralls and hood), **increase WBGT by 10 units** while conducting "Light Work" and **increase WBGT by 20 units** when doing "Moderate to Hard Work" tasks.

How do you know if you are hydrated? First monitor your water intake. Determine your water needs for your normal activity level. Secondly, monitor your hydration by urine color. This provides you a way to monitor fluid intake through the day and adjust quantity and type of fluid as needed. The chart to the right was developed by the U.S. Army. It uses urine color as a guide to hydration and dehydration. This chart is a useful tool, but it is not a definitive indicator of hydration status and is not for clinical use. Urine color can be affected by certain food, medications, vitamins, or supplements. Urine color will take some time to change after consumption of fluids or after high physical activity.

References and More Information:

- 1) OSHA Technical Manual Section III: Chapter 4 Heat Stress. (https://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_4.html)
- 2) Prevention of Heat and Cold Casualties. U.S. Army and Air Force. July 18, 2016. (<http://www.tradoc.army.mil/tpubs/regs/tr350-29.pdf>)
- 3) Heat and Exercise: Keeping Cool in Hot Weather. Mayo Clinic Staff. Mayo Foundation for Medical Education and Research. ART-20048167. May 16, 2014. (<http://www.mayoclinic.org/healthy-lifestyle/fitness/in-depth/exercise/art-20048167?pg=1>)

Are You Hydrated? Take the Urine Color Test

