Weather Rubric

The Weather Rubric is designed to help building managers and event coordinators determine whether an outdoor event can be safely hosted based on various weather conditions. The rubric allows users to manually input forecasted weather data. It then processes the data to provide a final decision on whether an event should be held outside, inside, or cancelled based on safety thresholds.

Features

- **Weather Input**: Users enter temperature, wind speed, chance of rain, air quality index, and more.
- **Wet-Bulb Temperature Calculation**: Accounts for temperature and humidity to assess heat stress risks.
- **Decision Making**: Generates a recommendation (Inside/Outside) based on input data.
- **Voting System**: Allows key stakeholders (Building Manager, Dining Manager, WUD Representative) to vote on the final decision.
- **Automated Email Report**: Summarizes weather conditions and decision factors for distribution.

Wet-Bulb Temperature (WBT) Integration

Wet-bulb temperature (WBT) is a critical metric for determining heat stress, as it considers both temperature and humidity. Unlike dry-bulb temperature, which only measures air temperature, WBT reflects the body's ability to cool itself via sweat evaporation.

Health and Safety Considerations

- 85°F WBT Threshold: If the WBT is 85°F or higher, the system automatically recommends moving the event indoors.

Why 85°F?

- At WBT levels above 85°F, the risk of heat exhaustion and heat stroke increases significantly, even for healthy adults (US National Weather Service).
- Children are more vulnerable to heat stress, with studies showing they experience heat-related illnesses at lower WBT levels than adults (American Academy of Pediatrics).
- ANSI ES1.7-2021: Recommends monitoring Wet Bulb Globe Temperature (WBGT) to assess heat stress and implement safety measures during events.
- Many sports and occupational safety guidelines (e.g., U.S. military, OSHA) recommend limiting outdoor activities at WBT above 82–85°F (OSHA Guidelines).
    - NCAA Soccer Guidelines mandate hydration breaks when WBGT reaches or exceeds 86°F to protect athletes from heat-related illnesses.

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Wet Bulb Globe Temperature Category Work/Rest and Water Intake

08/07/15

Unacclimated and Acclimated Work/Rest and Water Intake Chart

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	½	40/20 min	¾	30/30 min	¾
	Acclimated	78 – 79.9	continuous	½	continuous	¾	50/10 min	¾
Low	Unacclimated	80 – 84.9	40/20 min	½	30/30 min	¾	20/40 min	1
	Acclimated	80 – 84.9	continuous	½	50/10 min	¾	40/20 min	1
Moderate	Unacclimated	85 – 87.9	30/30 min	¾	20/40 min	¾	10/50 min	1
	Acclimated	85 – 87.9	continuous	¾	40/20 min	¾	30/30 min	1
High	Unacclimated	88 – 90	20/40 min	¾	10/50 min	¾	avoid	1
	Acclimated	88 – 90	continuous	¾	30/30 min	¾	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.

Madison, Wisconsin Summer Climate and WBT Risk

Madison, Wisconsin, experiences warm and humid summers, with average high temperatures reaching 82°F (28°C) in July and humidity levels averaging 71% during the same month (timeanddate.com). While temperatures exceeding 90°F (32°C) are relatively uncommon, the combination of heat and humidity can elevate the Wet-Bulb Temperature (WBT) to levels that pose health risks during outdoor events.

For instance, with an air temperature of 85°F (29°C) and relative humidity of 80%, the WBT can reach approximately 79°F (26°C). As temperatures approach 90°F (32°C) with similar humidity, the WBT can exceed 85°F (29°C), a threshold where the risk of heat-related illnesses increases significantly. Therefore, monitoring WBT is crucial in Madison's summer climate to ensure the safety of outdoor event participants.

By integrating WBT calculations into the decision-making process, the Weather Rubric provides a more comprehensive assessment of heat stress risks, accounting for both temperature and humidity factors prevalent in Madison during the summer months.

Wet-Bulb Temperature Calculation

- The user can either input WBT directly or enter humidity, allowing the system to calculate WBT automatically.
- The system prompts for WBT only when the normal temperature is 90°F or higher.
    - This is because at temperatures below 90°F, WBT is unlikely to exceed 85°F, meaning heat stress risk remains manageable without additional WBT calculations. (weather.gov)
    - However, at 90°F and above, humidity plays a significant role in reducing the body's ability to cool itself. Even moderate humidity levels can push the WBT above 85°F, creating unsafe conditions for prolonged exposure (U.S. Climate Resilience Toolkit).

Ensuring WBT stays below 85°F is crucial at higher temperatures to prevent heat exhaustion and heat stroke, particularly for vulnerable groups like children and the elderly (National Institute for Occupational Safety and Health).

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How the Rubric Works

1. **User Inputs Weather Data**
    - **Required fields (**denoted with a ***** on the web page**):**
        - Temperature
        - Wind Speed
        - Air Quality Index (AQI)
    - **Optional fields:**
        - Wind Gusts
        - Chance of Rain
        - Amount of Rain
        - Humidity
        - Thunderstorm Possibility
        - Severe Weather Watch
        - Severe Weather Warning
    - If a field is left blank, it defaults to **0** or **No** or **None**.
2. **Decision Computation**
    - Weather factors are assigned scores (1-4 scale) based on severity.
    - If any factor reaches a critical threshold (score 4), the event is automatically cancelled.
    - Otherwise, the system evaluates all input factors, calculates an average score, and then determines the final decision based on predefined ranges:
        - **GOOD:** Low overall risk based on the average score.
        - **OKAY:** Moderate risk, but still acceptable conditions.
        - **MARGINAL:** Increased risk requiring caution.
        - **BAD:** High risk, making outdoor events unsafe.

For any further questions or assistance, please use the **CONTACT US** button on the Weather Rubric to reach out for support.