Trent University Health and Safety Program	
Document Name: Heat Stress Plan	**Program Section:** 5. Hazardous Workplaces, Materials and Activities
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1. Purpose and Scope

People tend to feel most comfortable when the air temperature is between 20°C and 27°C and when the relative humidity ranges from 35 to 60%. Higher air temperature and humidity can be uncomfortable, but won't cause harm as long as the body is able to adjust and cope with the additional heat. Very hot (and humid) environments can overwhelm the body's coping mechanisms and lead to a variety of serious and possibly fatal conditions.

The risk of heat-related illness (heat stress) is determined by:

- Heat exposure, including metabolic heat (heat produced by the body), environmental temperatures (the temperature of the surrounding environment), and exposure to radiant heat sources (heat from single source, such as direct sunshine)
- The body's ability to cool itself through convection (i.e. through the evaporation of sweat), and
- Acclimatization, gradual adjustments the body makes so that it is better able to cool itself.

The risk of heat stress also varies from person to person, and can be affected by a person's general health, how well the person is able to acclimatize, cardiovascular fitness, body size, medical conditions, and/or drug use (prescription or otherwise).

Regulations require that the employer institute a *heat stress* or *hot weather* plan to protect workers who work in hot environments.

The requirements of this Heat Stress Plan apply to every Trent University workplace that is a 'hot environment'.

2. Definitions

ACGIH TLV means the threshold limit value for heat strain as published by the American Conference of Governmental Industrial Hygienists

Hot work environment means, for the purposes of this Plan, a workplace with:

- A Humidex of 35 or more
- An Environment Canada Humidex advisory (air temperature exceeding 30 C and Humidex exceeding 40)
- An Ontario Ministry of the Environment smog alert, or
- A heat waves (three or more days of temperatures of 32 C or more).

Humidex (humidity index) is a dimensionless unit that combines the effects of warm temperatures and humidity; Humidex is a used by Environment Canada to describe how hot the weather feels to the average person.

Supervisor means a person who has charge of a workplace or authority over a worker.

Worker means:

- A person who performs work or supplies services to the University for monetary compensation (employee, contractor), and
- A student who performs work or supplies services for no monetary compensation under a program approved by their University, College, School Board or other training agency.

3. Responsibilities

3.1 Associate Vice-Presidents, University Secretary, Deans, Directors, Principals, University Registrar and University Librarian

The Associate Vice-Presidents, University Secretary, Deans, Directors, Principals, University Registrar and University Librarian, in consultation with the Managers, Supervisors, Academic Chairs and/or Principal Investigators who report to them, are responsible for ensuring the requirements of this Heat Stress Plan are addressed in each of the areas and activities that operate under their authority.

3.2 Risk Management

Risk Management is responsible for:

- Establishing a Trent University Heat Stress Plan as an element of the University Health and Safety Program,
- Reviewing the Plan at least annually, and
- Providing expert advice and assistance, as required.

3.3 University Employees and other Workers

University employees and other workers are responsible for:

- Completing training and following direction provided by their supervisor with respect to work in hot environments, as required,
- Advising their supervisor of any signs or symptoms of a heat-related illness, and
- Reporting any related concerns that may arise.

4. Procedures

4.1 Monitoring workplace temperature and humidity

It is important that hot work environments be recognized as such.

Supervisors (or other designated person) should regularly monitor the temperature and humidity of any workplace that is (or is likely to be) a hot environment. Weather forecasts should be monitored for work done outdoors (from May 1 through September 31).

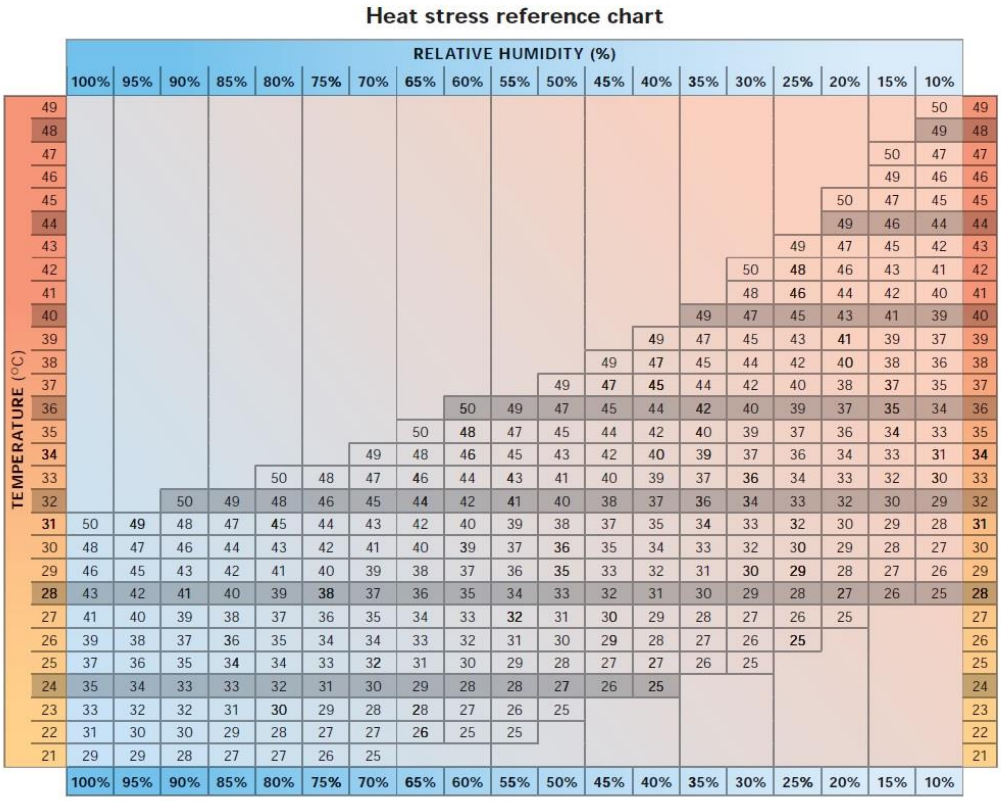
4.2 Measuring and assessing workplace temperature and humidity.

The measurement and assessment of a hot work environment should be undertaken as follows:

4.2.1 Take measurements of temperature and humidity using a thermal hygrometer (about $20 – $60 at hardware or office supply stores). Measurements should be taken in zones with similar heat exposures. Hygrometers should not be placed in direct sunlight or on a hot surface.

4.2.2 Use Table 1 and the measured values for temperature and humidity to determine the Humidex values.

Table 1: Heat Stress Reference Chart



4.2.3 Adjust Humidex for clothing:

- Add 5 if work requires a double layer of woven clothing, such as cotton overalls over summer clothes),
- Add 1-2 for protective clothing (e.g. gloves, hard hats, aprons and protective sleeves are required) and
- Add 2 -3 for radiant heat (e.g. work done outdoors in direct sunlight between 10:00 a.m. and 5:00 p.m.)

4.1.4 Use Table 2, Humidex-based Actions and the adjusted Humidex value to determine and implement the required actions.

"Humidex 1" controls apply when:

- Workers are acclimatized and doing heavy work, or
- Workers are unacclimatized and doing moderate work

"Humidex 2" controls apply when:

- Workers are acclimatized and doing moderate work, or
- Workers are unacclimatized and doing light work.

Table 2: Humidex-based Actions

Humidex 1 general controls	ACTION RECOMMENDED	Humidex 2 specific controls
30 – 37	Warn for symptoms and extra water	36 – 42
38 – 39	Work with 15 minutes/hour relief	43 – 44
40 – 41	Work with 30 minutes/hour relief	45 – 46*
42 – 44	Work with 45 minutes/hour relief	47 – 49*
45+	Hazardous to continue physical activity	50+*

* For Humidex ranges above 45, heat stress should be managed as per the ACGIH TLV

4.1.5 Some people are more vulnerable to heat and humidity than others. Symptoms of heat stress should never be ignored, regardless of temperature or humidity measurements.

4.1.6 Work in a hot environment where workers are required to wear an encapsulating suit requires medical supervision and the monitoring of vital signs.

Work that requires an encapsulating suit should be managed per ACGIH TLV procedures and requirements. These procedures do not apply to such work.

5 Establish suitable general control measures:

5.1 Provide water nearby and encourage workers to drink a cup of water every 20 to 30 minutes, even if they are not thirsty

5.2 Allow time to acclimatize to the heat [1]

5.3 Shield workers from radiant heat exposure, when possible (e.g. provide shade)

5.4 Provide fans, when possible, if temperature is below skin temperature (35 C) and humidity is below 70%. [2]

5.5 Provide mechanical aids to reduce physical work (e.g. dollies, carts, lifting devices)

5.6 Organize work to:

- Reduce the pace of activity;
- Do strenuous work at a cooler time of day (or season)
- Work in shaded areas
- Rotate workers in and out of how work areas

[1] Ontario summers are not hot enough for workers doing light work to acclimatize. Workers doing moderate work are only considered acclimatized if they regularly work around heat sources. Workers performing heavy work acclimatize quickly, but caution is recommended for the first warm weather of the season; Humidex 1 may be too high to protect an unacclimatized worker.

[2] The use of fans will actually increase a worker's temperature if workplace temperature and humidity exceed these values.

5.7 Consider the use of protective equipment such as cooling vests.

5.8 A Heat Stress Response Plan template is provided as Appendix A. The template can be used to develop (and document) an appropriate, workplace-specific heat stress control plan. The completed document might also be useful for training and instruction purposes.

6 Encourage suitable personal control measures

Workers can take steps to reduce heat stress. Providing instruction and encouraging the following is recommended:

- Avoid eating large meals before work in a hot environment
- Avoid alcohol or beverages with caffeine, which make the body lose water
- Wear light clothing that permits the evaporation of sweat
- Wear sunscreen and a hat when working outside
- Check with their physician if they are taking medication likely to affect heat tolerance
- Make healthy lifestyle choices (i.e. body weight, fitness, diet, rest, etc.)

7 Establish a first aid response system

Workers should receive instruction of the signs and symptoms of heat stress (Appendix B) and watch for signs of heat stress in themselves and their co-workers. A buddy system is recommended.

A worker trained in first aid should be available in the work area, and a suitable first aid kit should be readily available.

Signs or symptoms of heat stress should be immediately reported to the first aid attendant. The first aid attendant will provide first aid treatment and arrange follow up medical care (e.g. by calling Campus Security (1333) and emergency medical responders (911)), as required.

Heat stress incidents should also be reported to the area supervisor or manager as soon as possible. Supervisors and managers should investigate each incident to identify and address program gaps or weaknesses, as required.

A suitable communications device (e.g. phone or cell phone) should be readily available at the worksite.

8 Training

Every University worker who works in a hot environment must receive instruction in the following:

- The risks, signs and symptoms of heat stress
- Procedures to be followed if a worker experiences heat stress or see signs of heat stress in another worker
- Implementation criteria (“triggers”) and
- Workplace-specific control measures and procedures, including first aid procedures.

Training for those who work in hot weather should be refreshed annually, before the hot summer weather begins.

9 Legislation

Occupational Health and Safety Act, s. 25 (2) (h)

The compliance purposes Ontario's Ministry of Labour recommends the current threshold limit value (TLV) for heat stress and heat strain, published by the American Conference of Governmental Industrial Hygienists (ACGIH, https://www.acgih.org/home).

10 Resources

10.1 Heat Stress Awareness Guide, Occupational Health and Safety Council of Ontario (OHSCO): https://www.ohcow.on.ca/edit/files/heatstressawareness/Heat%20Stress%20Awareness%20Guide.pdf

10.2 Ministry of Labour, Managing Heat Stress at Work: https://www.ontario.ca/page/managing-heat-stress-work

10.3 Canadian Centre for Occupational Health and Safety, Hot Environments – Health Effects and First Aid: https://www.ccohs.ca/oshanswers/phys_agents/heat_health.html

Appendix A: Workplace-specific Heat Stress Response Plan template (Humidex 2)

Action(s):	Actionable by:
Humidex below 25	
Measure and record temperature, humidity and humidex every other hour	
Humidex of 25 - 29	
Advise workers to take water as needed	
Provide and resupply water, as required.	
Measure and record temperature, humidity and humidex every other hour	
Humidex of 30 - 33	
Post a heat stress alert notice in an appropriate location.	
Alert staff to watch for signs of heat stress	
Encourage staff to drink 1 cup of water every 20 – 30 minutes, even if they're not thirsty	
Provide and resupply cool water, as required.	
Measure and record temperature, humidity and humidex every hour	
Humidex of 34 - 37	
Post a heat stress warning notice	
Advise staff to drink 1 cup of water every 20 – 30 minutes, even if they're not thirsty	
Provide and resupply cool water, as required.	
Confirm staff are aware of heat stress warning signs and symptoms	
Measure and record temperature, humidity and humidex every hour	
Humidex of 38 - 39	
Post a heat stress warning notice	
Advise staff to drink at least one cup of water every 20 minutes	
Provide and resupply cool water, as required.	
Schedule and require staff to take a 15 minute break every hour. The break must be taken in a cool location.	
Confirm staff are aware of heat stress warning signs and symptoms	
Encourage staff to watch for and report any sign of heat stress	
Measure and record temperature, humidity and humidex every other hour	

Humidex of 40 - 41	
Continue with the provisions listed above	
Schedule and require staff to take a 30 minute break every hour. The break must be taken in a cool location.	
Humidex of 42 – 44	
Continue with the provisions listed above	
Schedule and require staff to take a 45 minute break every hour. The break must be taken in a cool location.	
Humidex of 45 or greater	
Only medically supervised work is permitted.	
Any Humidex value	
Immediately report a heat stress incident.	
Treat signs and symptoms of heat stress (i.e. first aid, provide for medical attention), as required.	

Appendix B: Causes, Symptoms and Treatment of Heat-related Illnesses

Illness	Cause	Symptoms	Treatment
Heat rash	Hot, humid environment; plugged sweat glands	Red, bumpy rash with severe itching	Change into dry clothes and avoid hot environments, rinse skin with cool water
Sunburn	Too much exposure to the sun	Red, painful or blistering and peeling skin	If the skin blisters, seed medical aid, use skin lotions (avoid topical anaesthetics) and work in the shade
Heat cramps	Heavy sweating drains a person's body of salt, which cannot be replaces by just drinking water	Painful cramps in arms, legs or stomach that occur suddenly at work or later at home. Heat cramps are serious because they can be a warning of other more dangerous heat-induced illnesses	Move to a cool area; loosen clothing and drink an electrolyte-replacement beverage, if the cramps are severe or don't go away, seek medical treatment
Fainting	Fluid loss and inadequate water intake	Sudden fainting after at least two hours of work; cool moist skin; weak pulse	**Get medical attention** Assess need for CPR; move to a cool area; loosen clothing; make person lie down; and when the person is conscious, offer sips of cool water. Fainting may also be due to other illnesses.
Heat exhaustion	Fluid loss and inadequate salt and water intake causes the body's cooling system to start to break down	Heavy sweating; cool, moist skin; body temperature above 38 C; weak pulse; tired and weak, nausea and vomiting; very thirsty; panting or breathing rapidly; blurred vision	**Get medical aid** This condition can lead to heat stroke, which can kill; move the person to a cool shaded area; loosen or remove excess clothing; provide cool water to drink; fan and spray with cool water
Heat stroke	If a person's body has used up all its water and salt reserves it will stop sweating, which can cause body	High body temperature (above 41C) and any of the following: the person is weak, confused,	**Call an ambulance This is an immediate medical emergency. Prompt action may save the person's life.**

	temperature to rise; heat stroke may develop suddenly or may follow from heat exhaustion	upset or acting strangely; has hot, dry, red skin; a fast pulse; headache or dizziness; in later stages, a person may pass out or have convulsions	This condition can kill a person quickly; remove excess clothing; fan and spray the person with cool water; **if the person is conscious** offer sips of cool water