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Name:	Heat Stress Guidelines
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Policy:

The following protocol shall be followed by Facilities Management and Directors/Deans/Chairs/ Managers and Supervisors to provide advice to staff and faculty regarding times of high temperatures and humidity. Staff and Faculty shall not follow the guidelines independent of their supervisor or Dean. Supervisors and Deans shall provide direction to their staff and faculty on how to respond to the heat stress situation based on the guidelines in this policy. Facilities Management shall provide information on the Humidex level when requested. It should be noted that the campus has several air conditioned buildings that will provide heat stress relief as indicated.

Protocol:

Air Supply

Standard setting bodies such as the American Society of Heating, Refrigerating and Air Conditioning Engineers, the Canadian Standards Association and the National Research Council have established guidelines for ventilation of office and related buildings, which are referenced in Building Codes. Saint Mary's University has established ventilation guidelines based on these standards.

It is important to note that there is no requirement for office or related buildings to be air conditioned, although there are requirements for the provision of fresh air to all occupied spaces.

Buildings which do not have central air supply or air conditioning systems must have windows that can be opened by the occupant to provide fresh air and air movement.

Temperature and Humidity Control

For buildings with air conditioning systems, Saint Mary's University has established design guidelines for the temperature and relative humidity of air supplied by those systems.

Heat Stress

Occupational Health and Safety bodies such as the American Conference of Governmental Industrial Hygienists, the Canadian Centre for Occupational Health and Safety, the Occupational Health and Safety Council of Ontario and the Occupational Health Clinics for Ontario Workers have established guidelines to assist in the management of heat stress.

There are a number of ways of measuring heat stress. For the conditions potentially present at Saint Mary's University, heat stress can be evaluated using a combination of the dry bulb (air) temperature and relative humidity. This can be done using a thermo-hygrometer, with the results then being combined into a Humidex value.

The following guidelines have been drawn from these sources and adapted to the needs of Saint Mary's University. They are based on the objective of preventing a person's core body temperature from rising above 38°C for an un-acclimatized person and 38.5 °C for an acclimatized person. Below these levels most persons will not experience heat stress.

Indoor Humidex-Based Heat Stress Response Guidelines

As the indoor dry bulb air temperature rises above 29°C, occupants will deem conditions to be increasingly uncomfortable and the area should be evaluated for the amount of heat stress by measuring the relative humidity and temperature and entering both measurements on the chart in Appendix A to determine the Humidex. The evaluation will be performed by Facilities Management when requested by the occupant of the space.

It is unlikely that indoor workers or indoor sportspersons at Saint Mary's University will be acclimatized to heat because they will not have been exposed to enough heat for long enough periods to become acclimatized. Therefore, the Humidex Based Heat Response Guidelines in Appendix B are based on the assumption that persons are not acclimatized.

The Table in Appendix B provides Humidex Based Heat Response Guidelines for un-acclimatized workers doing light to moderate physical indoor work (see Appendix D for definitions), such as desk work, classroom instruction, laboratory work or custodial and maintenance work, and for indoor sports activities.

The Humidex Based Heat Response Guidelines are based on the worker wearing clothing that makes it easy for sweat to evaporate. The guidelines assume regular summer clothes, including light shirt and pants, underwear and shoes.

For a worker who must wear full cotton overalls over their clothes, 5° should be added to the Humidex value. Other clothing configurations should be prorated accordingly. For example, gloves, apron and protective sleeves or a lab coat over summer clothes would add 2° to the Humidex value.

When using Appendix B, clothing-adjusted Humidex Values should be used, as appropriate.

Outdoor Humidex Based Heat Stress Response Guidelines

The Table in Appendix C provides Humidex Based Heat Response Guidelines for un-acclimatized workers doing light outdoor physical work (see Appendix D for definitions), such as operating motorized equipment or undertaking scientific field activities, and for acclimatized workers doing moderate outdoor physical work (see Appendix D for definitions), such as landscaping or construction, and for outdoor sports activities.

The Humidex Based Heat Response Guidelines are based on the worker/ sportsperson wearing clothing that makes it easy for sweat to evaporate. The plan assumes regular summer clothes, including light shirt and pants, underwear and shoes.

For a worker who must wear full cotton overalls over their clothes, 5° should be added to the Humidex value. Other clothing configurations should be prorated accordingly. For

example, gloves, apron and protective sleeves and hard hat would add 2° to the Humidex value.

For a sportsperson, the effect of the sports uniform and any protective equipment must be taken into account. For example, tennis attire would not add to the Humidex value, but full football gear would add 5° to the Humidex value.

For outdoor work or sports activity in direct sunlight between the hours of 10 am and 5 pm, 2 ° or 3° should be added to the Humidex value, depending on the amount of cloud cover.

When using Appendix C, clothing-adjusted and sunlight-adjusted Humidex Values should be used, as appropriate.

Day Care Humidex Based Heat Stress Response Guidelines

Children may be more susceptible to heat stress and will be less able to self evaluate the possible increase in their body temperature due to external factors or activity level. They will also be less able to follow instructions regarding adequate hydration or to communicate their distress. Hence, heat stress standards for them are reduced.

When the indoor dry bulb (air) temperature exceeds 26°C for a period of one hour or more, the area should be evaluated by also measuring the relative humidity and entering both measurements on the chart in Appendix A to determine the Humidex.

When the Humidex in the indoor area exceeds 35 for a period of one hour or more, the children should be moved to an air conditioned area.

When the outdoor dry bulb (air) temperature exceeds 29°C for a period of one hour or more, the Humidex should be determined.

When the Humidex in the outdoor area exceeds 38 for a period of one hour or more, the children should be moved to an air conditioned area.

Appendix A: Humidex

Read the Humidex from the following chart by finding the number where the dry bulb temperature (°C) intersects with the relative humidity (%).

		RELATIVE HUMIDITY (%)																		
		100%	95%	90%	85%	80%	75%	70%	65%	60%	55%	50%	45%	40%	35%	30%	25%	20%	15%	10%
TEMPERATURE (°C)	49																		50	49
	48																		49	48
	47																		50	47
	46																		49	46
	45																		50	45
	44																		49	44
	43																		49	43
	42																		50	42
	41																		48	41
	40																		49	40
	39																		47	39
	38																		49	38
	37																		47	37
	36																		49	36
	35																		50	35
	34																		49	34
	33																		50	33
	32																		49	32
	31	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
	30	48	47	46	44	43	42	41	40	39	37	36	35	34	33	32	30	29	28	27
29	46	45	43	42	41	40	39	38	37	36	35	33	32	31	30	29	28	27	26	
28	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	
27	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25		27	
26	39	38	37	36	35	34	34	33	32	31	30	29	28	27	26	25			26	
25	37	36	35	34	34	33	32	31	30	29	28	27	27	26	25				25	
24	35	34	33	33	32	31	30	29	28	28	27	26	25						24	
23	33	32	32	31	30	29	28	28	27	26	25								23	
22	31	30	30	29	28	27	27	26	25										22	
21	29	29	28	27	27	26	25												21	
		100%	95%	90%	85%	80%	75%	70%	65%	60%	55%	50%	45%	40%	35%	30%	25%	20%	15%	10%

Acknowledgement: This chart is copied, with permission, from the Heat Stress Awareness Guide published by the Occupational Health and Safety Council of Ontario, 2007.

Appendix B: Humidex-Based Heat Response Guidelines for Indoor Work or Sports Activities

(for un-acclimatized workers doing light to moderate physical indoor work, such as desk work, classroom instruction, laboratory work or custodial and maintenance work, and for indoor sports activities)

Note: Take the Humidex value from the Chart in Appendix A and modify it for a clothing adjustment, if required. The guidelines assume regular summer clothes, including light shirt and pants, underwear and shoes. For a worker who must wear full cotton overalls over their clothes, 5° should be added to the Humidex value. Other clothing configurations should be prorated accordingly. For example, gloves, apron and protective sleeves or a lab coat over summer clothes would add 2° to the Humidex value.

Humidex*	Heat Response Guidelines (Indoor)
30-33 Low	Post Heat Stress Alert Notice Encourage workers/sportspersons to drink extra water Start recording dry bulb air temperature and relative humidity
34-37 Low	Post Heat Stress Warning Notice Notify workers/sportspersons that they need to drink extra water Ensure workers/sportspersons are trained to recognize symptoms of heat stress
38-39 Medium	Provide workers/sportspersons with 15 minutes relief/rest break per hour, preferably in an air conditioned or cool location Provide adequate cool (10-15°C) water Encourage workers/sportspersons to drink at least 1 cup (240 ml) of water every 20-30 minutes Ensure that persons with symptoms of heat stress get medical attention
40-41 Moderate	Provide workers/sportspersons with 30 minutes relief/rest break per hour, preferably in an air conditioned or cool location Provide adequate cool (10-15°C) water Encourage workers/sportspersons to drink at least 1 cup (240 ml) of water every 15-20 minutes Ensure that persons with symptoms of heat stress get medical attention
42-44	If feasible to continue work or sports activity, provide workers/sportspersons with 45 minutes relief/rest break per hour, preferably in an air conditioned or cool location Provide adequate cool (10-15°C) water Encourage workers/sportspersons to drink at least 1 cup (240 ml) of water every 10-15 minutes Ensure that persons with symptoms of heat stress get medical attention
45 or over Extreme	Hazardous to continue physical activity Stop work or sports activity until Humidex is 44 or less Only medically supervised work or sports activity can continue

* Use clothing-adjusted Humidex as described in Note above.

Appendix C: Humidex-Based Heat Response Guidelines for Outdoor Work or Sports Activities

(for un-acclimatized workers doing light outdoor physical work, such as operating motorized equipment or undertaking scientific field activities, for acclimatized workers doing moderate outdoor physical work such as landscaping or construction, and for outdoor sports activities)

Notes: Take the Humidex value from the Chart in Appendix A and modify it for a clothing adjustment, if required. The guidelines assume regular summer clothes, including light shirt and pants, underwear and shoes. For a worker who must wear full cotton overalls over their clothes, 5° should be added to the Humidex value. Other clothing configurations should be prorated accordingly. For example, gloves, apron and protective sleeves and hard hat would add 2° to the Humidex value. For a sports person, the effect of the sports uniform and any protective equipment must be taken into account. For example, tennis garb would not add to the Humidex value, but full football gear would add 5° to the Humidex value. For outdoor work or sports activity in direct sunlight between the hours of 10 am and 5 pm, 2 or 3° should be added to the Humidex value, depending on the amount of cloud cover.

Humidex*	Heat Response Guidelines (Outdoor)
36-39 Low	Post Heat Stress Alert Notice Encourage workers/sportspersons in the area to drink extra water Start recording dry bulb air temperature and relative humidity
40-42 Low	Post Heat Stress Warning Notice Notify workers/sportspersons in the area that they need to drink extra water Ensure workers/sportspersons are trained to recognize symptoms of heat stress
43-44 Medium	Provide workers/sportspersons with 15 minutes relief/rest break per hour, preferably in an air conditioned or cool location Provide adequate cool (10-15°C) water Encourage workers/sportspersons to drink at least 1 cup (240 ml) of water every 20-30 minutes Ensure that persons with symptoms of heat stress get medical attention
45-46 Moderate	Provide workers/sportspersons with 30 minutes relief/rest break per hour, preferably in an air conditioned or cool location Provide adequate cool (10-15°C) water Encourage workers/sportspersons to drink at least 1 cup (240 ml) of water every 15-20 minutes Ensure that persons with symptoms of heat stress get medical attention
47-49 High	Only acclimatized persons should be allowed to work or participate in the sports activity. If feasible to continue work or sports activity, provide workers/sportspersons with 45 minutes relief/rest break per hour, preferably in an air conditioned or cool location Provide adequate cool (10-15°C) water Encourage workers/sportspersons to drink at least 1 cup (240 ml) of water every 10-15 minutes Ensure that persons with symptoms of heat stress get medical attention
50 or over Extreme	Hazardous to continue physical activity Stop the work or sports activity until Humidex is 49 or less Only medically supervised work can continue

* Use clothing-adjusted and sunlight-adjusted Humidex as described in Notes above.

Appendix D: Work (Activity) Load

A significant contributor to heat stress is the amount of heat generated by the metabolic activity of the individual, which is why Heat Stress Guidelines are linked to the activity level or work load:

Rest: sitting quietly or with moderate arm movements (e.g.: reading, working at a computer, or attending a lecture)

Light Work or Activity: sitting or standing to control equipment, performing light hand or arm work with occasional walking (e.g.: laboratory analyses, giving a lecture, driving a car, making field observations, piloting a power boat, using a table saw, or operating a floor polisher)

Moderate Work or Activity: Walking with moderate pushing or pulling, walking at a moderate pace (e.g.: stocking shelves with moderately heavy items, scrubbing in a standing position, sweeping floors or sidewalks, operating a walk-behind lawn mower, or field work requiring the carrying of equipment,)

Heavy Work or Activity: pick and shovel work, carrying, pushing or pulling heavy loads, walking at a fast pace (e.g.: a carpenter sawing by hand, rowing a boat, field work requiring hiking with a backpack, or playing tennis or soccer)

Very Heavy Work or Activity: very intense activity at fast to maximum pace (e.g.: shoveling wet sand, maximum sports exertion such as running a 400 metre race)