A. Background and Definitions

**Acclimatization**: the physiological changes that occur after prolonged exposure, allowing the body to adapt to a new temperature, climate, or environment.

**Dehydration**: the loss or deficiency of water in body tissues which may be caused by perspiration, vomiting, or diarrhea. Symptoms include excessive thirst, nausea and exhaustion.

**FMS**: Facilities Management Services.

**Hot Work Environment**: conditions in the workplace (air temperature, radiant temperature, humidity, air velocity, clothing and physical activity) which provide a risk for hazardous body heat storage.

**Humidex**: an index that describes how hot or humid weather feels to the average person.

**WSIB**: Workplace Safety and Insurance Board.

B. Purpose

The purpose of this practice is to develop guidelines for working in hot environments, reduce the potential for heat-related illnesses, and to ensure compliance with the *Occupational Health & Safety Act* of Ontario and its regulations. This procedure applies to all employees working in hot environments at Niagara College.

C. Practice Statements

1. Niagara College recognizes the potential problems caused by high temperatures in the workplace. A “hot” work environment at Niagara College is defined as a condition or situation in the workplace which provides a risk for hazardous body heat storage. Examples include air temperature, radiant temperature, humidity, air velocity, clothing and physical activity.

2. This procedure consists of four sections that describe the precautions to follow in “hot” work environments:
   i. Heat Monitoring Methods
   ii. Safe Work Practices & Control Measures
iii. Heat Exposure Illnesses
iv. Training

3. Department Managers/Supervisors shall ensure that all employees in their department who work in hot environments are instructed in this procedure prior to the commencement of work.

Responsibilities

4. Department Managers/Supervisors are responsible for:
   a) ensuring all employees in their department who work in hot environments are instructed in this procedure;
   b) scheduling strenuous work during cooler times of day where possible;
   c) making cool drinking water available to employees and encouraging them to drink it often (a cup every 20-30 minutes);
   d) providing mechanical aids for employees to avoid strenuous lifting/physical activity;
   e) exercising due diligence for personal safety when assigning work in hot environments, and ensuring that all employees are familiar with first aid procedures for heat stress; and
   f) assigning a designate to keep a record of humidex readings throughout the day (morning, noon and afternoon).

5. Workers are responsible for:
   a) taking precautions as necessary to prevent heat-related illnesses, and
   b) participating in training as required.

6. Health and Safety Office is responsible for:
   a) providing information on heat stress to departments as necessary, and
   b) tracking heat-related illnesses and complaints to measure the effectiveness of the Heat Stress Prevention Practice.

Heat Monitoring Methods

7. Acclimatization: Employees who perform moderate work regularly in hot environments can develop a certain degree of tolerance for heat, which is called acclimatization. Examples of workers at the College that can become acclimatized include FMS, greenhouse staff and kitchen staff, who are consistently working in a hot environment.
8. **Self-Regulation**: Employees will vary in their ability to work within a hot environment, depending on factors such as age and health, physical shape, the type of clothes worn to work, amount of fluid intake, and intensity of exertion. It is therefore very important for individuals to respond to any symptoms of heat stress immediately, regardless of weather or heat monitoring measurements.

9. **Humidex Comfort Ranges – Hot Weather Plans**: In the weather forecast, Humidex is used to inform the public about the measurement of heat outdoors. The Humidex combines the temperature and humidity into one number to reflect the perceived temperature by the average person. It is therefore a better measure of how stifling the air feels than either temperature or humidity alone. The Humidex comfort ranges are as follows:

<table>
<thead>
<tr>
<th>Humidex Range (Degrees Celsius)</th>
<th>Degree of Comfort</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>Comfortable</td>
</tr>
<tr>
<td>30-39</td>
<td>Varying degree of discomfort</td>
</tr>
<tr>
<td>40-44</td>
<td>Great discomfort; avoid exertion</td>
</tr>
<tr>
<td>45 +</td>
<td>Dangerous: Most work must be restricted</td>
</tr>
<tr>
<td>55 +</td>
<td>Heat Stroke imminent</td>
</tr>
</tbody>
</table>

Environment Canada defines an extremely high humidex reading as one that is over 40.

a) **Hot Weather: Humidex Readings**: Humidex readings can be found on Environment Canada’s website at [www.weatheroffice.gc.ca](http://www.weatheroffice.gc.ca). Niagara College will accept Environment Canada’s Humidex measurement for Welland, ON, St. Catharines, ON and Niagara Falls, ON, as the readings for outdoor “moderate” work on campus (see definition below). This measurement will determine the appropriate action to take when the Humidex is high (see Humidex-Based Heat Response Plan described below).

b) **Indoor Readings / Hot Processes: Wet Bulb Globe Temperature**: The Ministry of Labour uses Wet Bulb Globe Temperature (WBGT) to measure heat stress. This calculation is based on humidity and radiant heat. This measurement applies to job tasks involving significant radiant-heat load from process-related heat. Environment Canada has published a heat stress reference chart that translates WBGT values from heat stress Threshold Limit Values into Humidex units (Table 1). This can determine readings for indoor areas and process-related heat by taking a measurement of the temperature and relative humidity, and cross referencing it to this chart.
This table is based on the following assumptions:

- Work is being performed under conditions with little or no radiant heat.
- Workers are wearing regular summer clothing (light shirt and pants, socks & shoes).
- For outdoor work in direct sunlight between the hours of 10 a.m. and 4 p.m., add 1-2 degrees to your Humidex measurement.
- For indoor radiant heat exposures, Department Managers/Supervisors can determine whether the exposure involves more or less radiant heat than direct sunlight and adjust the 1 – 2 degree factor accordingly.
c) **Humidex Based Heat Response Plan:** Humidex-based heat response plans will begin when the Humidex reading is at 30 or more. The following table details the recommended action to be taken when Humidex measurements are high:

<table>
<thead>
<tr>
<th>HUMIDEX 1</th>
<th>ACTION PLAN</th>
<th>HUMIDEX 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-37</td>
<td>Notify employees of heat stress warning and that they need to drink extra water and be aware of heat stress symptoms in themselves and coworkers</td>
<td>36-42</td>
</tr>
<tr>
<td>38-39</td>
<td>Work with 15 minutes relief per hour</td>
<td>43-44</td>
</tr>
<tr>
<td>40-41</td>
<td>Work with 30 minutes relief per hour</td>
<td>45-46</td>
</tr>
<tr>
<td>42-44</td>
<td>Work with 45 minutes relief per hour</td>
<td>47-49</td>
</tr>
<tr>
<td>45 or over</td>
<td>Hazardous to continue physical activity</td>
<td>50 and over</td>
</tr>
</tbody>
</table>

**NOTE:**

The **HUMIDEX 1** readings are to be used for unacclimatized workers who are doing “moderate” work in hot environments, and ranges indicate the need for general heat stress controls. Examples may include: FMS (Niagara-on-the-Lake) and Campus Security.

The **HUMIDEX 2** readings are to be used for acclimatized workers doing “moderate” work in hot environments, and ranges indicate the need for job-specific controls. Examples may include: FMS (Welland), Greenhouse staff and Benchmark staff.

The WSIB Heat Stress Awareness Guide defines the three types of work as follows:

i. **Light work:** sitting/standing, doing light arm work
ii. **Moderate work:** work with some pushing and lifting
iii. **Heavy work:** work requiring intense physical exertion – for example shoveling dry sand

**Safe Work Practices & Control Measures**

10. **General Controls for Working in Hot Environments (Humidex 1 Readings):** The following safe work practices are general guidelines that will assist with the prevention of heat stress hazards while working in a hot environment:

a) Keep skin clean and dry.

b) Work in the shade when possible.

c) Learn to recognize the signs and symptoms of heat stress in yourself and coworkers. Take breaks when feeling tired, dizzy, or weak.

d) Cover skin with lightweight, loose clothing where possible.
e) Apply sunscreen in the morning and again at your lunch break if working outside.

f) Reduce activity levels and/or heat exposure whenever possible.

g) Drink fluids regularly, avoiding caffeine and alcohol.

h) Adopt the buddy system; check on your coworkers periodically to assist with the early recognition of heat illness symptoms.

11. **Job-Specific Control Measures to Reduce Heat Stress (Humidex 2 Readings):** Some positions at Niagara College may require certain tasks to be done in the heat. Examples include, but are not limited to, groundskeepers, maintenance and production kitchen. Department Managers/Supervisors shall schedule strenuous work to be done during cooler times of day where possible. The following measures should be taken where possible to reduce heat stress:

a) Drink at least one cup of water every 20-30 minutes, even if you don’t feel thirsty.

b) Adopt the buddy system; check on your coworkers periodically to assist with the early recognition of heat illness symptoms.

c) Use mechanical aids for manual lifting where possible (i.e. dollies, carts, hoists, etc.) Use cooling fans where possible.

d) Alter your work/rest schedule. Take breaks as needed and alter your pace of work.

e) Rotate work with coworkers if possible. If you feel tired, weak, or dizzy, take a break. Breaks should be taken in air-conditioned buildings whenever possible.

f) Heat stress increases when heavy work is done at temperatures above 30 degrees. Don’t push yourself beyond your limits. It could be harmful to your health, and could put you at risk of having an accident.

g) Wear sunscreen and cover your head if working outside as part of your personal protective equipment.

h) Notify your Supervisor or co-worker of any heat stress symptoms immediately.

**NOTE:** Cool drinking water will be made available to employees who shall be encouraged to drink it often (a cup every 20-30 minutes).

12. **Personal Control Measures to Reduce Heat Stress (All Staff):** It is important that employees “listen” to their bodies and respond to any symptoms of heat stress. The following measures can help to prevent heat-related illnesses:

a) Hydrate yourself. Water is crucial to helping the body adjust to high temperatures. The rate of water intake must equal the increased rate of water loss by perspiration to keep your body temperature normal.

b) Eat smaller but more frequent meals or snacks while working in hot environments.
c) Avoid alcohol or beverages with caffeine – these make the body lose water and increase the risk of heat stress.

d) Wear light clothing that permits the evaporation of sweat (i.e. cotton clothing).

e) Check with your doctor if your medication may affect your heat tolerance.

f) Make healthy lifestyle choices (i.e. body weight, fitness, diet, rest).

**Heat Exposure Illnesses**

13. Heat stress symptoms are a set of natural signals telling you that something needs to be done to balance your body’s heating and cooling. As your body heats up, it tries to rid itself of excess heat through the evaporation of sweat. If it is unable to cool itself this way, your body temperature will increase. When body temperature gets above 38-39°C, the brain starts to overheat, leading to a shutdown of your body’s cooling system (sweating stops). Your temperature now rises even faster, leading to heat stroke and possibly death.
14. The causes, symptoms, treatment, and prevention of various heat-related illnesses are listed here:

<table>
<thead>
<tr>
<th>HEAT RASH</th>
<th>SUNBURN</th>
<th>HEAT CRAMPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot humid environment; plugged sweat glands.</td>
<td>Too much exposure to the sun.</td>
<td>Heavy sweating drains a person’s body of salt, which cannot be replaced just by drinking water.</td>
</tr>
<tr>
<td>Read bumpy rash with severe itching.</td>
<td>Red, painful, or blistering and peeling skin.</td>
<td>Painful cramps occur commonly in the most worked muscles (arms, legs or stomach); this can happen suddenly at work or later at home.</td>
</tr>
<tr>
<td>Change into clean dry clothes and avoid hot environments. Rinse skin with cool water.</td>
<td>If the skin blisters, seek medical aid, use skin lotions (avoid topical anesthetics) and work in the shade.</td>
<td>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 aid.</td>
</tr>
<tr>
<td>Wash regularly to keep skin clean and dry.</td>
<td>Work in the shade; cover skin with clothing; apply skin lotions with a sun protection factor of at least 15. People with fair skin should be especially cautious.</td>
<td>Reduce activity levels and/or heat exposure. Drink fluids regularly. Workers should check on each other to help spot the symptoms that often precede heat stroke.</td>
</tr>
</tbody>
</table>
### FAINTING
- Fluid loss and inadequate water intake.

### HEAT EXHAUSTION
- Fluid loss and inadequate salt and water intake causes the body’s cooling system to start to break down.

### HEAT STROKE
- If a person’s body has used up all its water and salt reserves, it will stop sweating, which can cause body temperature to rise; heat stroke may develop suddenly or may follow from heat exhaustion.

<table>
<thead>
<tr>
<th>CAUSES</th>
<th>SYMPTOMS</th>
<th>GET MEDICAL ATTENTION</th>
<th>GET MEDICAL AID</th>
<th>CALL AN AMBULANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudden fainting after at least two hours of work; cool moist skin; weak pulse</td>
<td>Heavy sweating; cool, moist skin; body temperature above 38°C; weak pulse; normal or low blood pressure; tired and weak, nausea and vomiting; very thirsty; panting or breathing rapidly; blurred vision</td>
<td>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.</td>
<td>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</td>
<td>This condition can kill a person quickly; remove excess clothing; fan and spray the person with cool water; offer sips of cool water, if the person is conscious</td>
</tr>
</tbody>
</table>

### PREVENTION
- Reduce activity levels and/or heat exposure. Drink fluids regularly. Workers should check on each other to help spot the symptoms that often precede heat stroke.

### TREATMENT
- Get Medical Attention.
- Get Medical Aid.
- Call an Ambulance.

### CAUTIONS

#### Fainting
- Fainting may also be due to other illnesses.

#### Heat Exhaustion
- High body temperature (above 41°C) and any of the following: the person is weak, confused, upset, or acting strangely; has hot, dry, red skin; a fast pulse; headache or dizziness; in later stages, a person may pass out and have convulsions.

**THIS IS AN IMMEDIATE MEDICAL EMERGENCY. PROMPT ACTION MAY SAVE THE PERSON’S LIFE.**

#### Heat Stroke

15. All heat-related incidents or illnesses must be reported to your supervisor immediately. Supervisors will complete an Accident/Incident Report form as necessary.
Training

16. The prevention of heat stress and heat-related illness begins with educating supervisors and employees on the hazards of working in hot environments.

17. Department Managers/Supervisors shall ensure all employees in their department who may be exposed to hot environments are trained in this procedure prior to work.

18. Safety talks should also be conducted in applicable departments every season as a refresher session.

19. The Health & Safety Office will track heat-related illnesses and complaints to measure the effectiveness of the Heat Stress Prevention Program. Additional control measures will be implemented as necessary.

D. Related Documents and Links

*Occupational Health and Safety Act (OHSA):*
http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90o01_e.htm

Ministry of Labour “Heat Stress Health & Safety Guideline”:

Workplace Safety & Insurance Board “Heat Stress Awareness Guide”