This Document was current as of August 26, 2004

Please check with the appropriate authority to verify if this is still current

Heat Stress

The Legal Requirements:

Employers have a duty under section 25(2)(h) of the Occupational Health and Safety Act to take every precaution reasonable in the circumstances for the protection of a worker. This includes developing hot environment policies and procedures to protect workers in hot environments due to hot processes or hot weather. For compliance purposes, the Ministry of Labour recommends the Threshold Limit Values (TLVs) for Heat Stress and Heat Strain published by the American Conference of Governmental Industrial Hygienists (ACGIH). These values are based on preventing unacclimatized workers' core temperatures from rising above 38°C.

This Guideline is intended to assist employers, workers and other workplace parties in understanding heat stress, and in developing and implementing policies to prevent heat-related illness in the workplace.

What Is Heat Stress?

Working or playing where it is hot puts stress on your body's cooling system. When heat is combined with other stresses such as hard physical work, loss of fluids, fatigue or some medical conditions, it may lead to heat-related illness, disability and even death.

This can happen to anybody-even the young and fit. In Ontario, heat stress is usually a concern during the summer. This is especially true early in the season, when people are not used to the heat.

Heat exposure may occur in many workplaces. Furnaces, bakeries, smelters, foundries and heavy equipment are significant sources of heat inside workplaces. For outdoor workers, direct sunlight is the main source of heat. In mines, geothermal gradients and equipment contribute to heat exposure. Humidity in workplaces also contributes to heat stress.

How We Cope With Heat

Your body is always generating heat and passing it to the environment. The harder your body is working, the more heat it has to lose. When the environment is hot or humid or has a source of radiant heat (for example, a furnace or the sun), your body

must work harder to get rid of its heat.

If the air is moving (for example, from fans) and it is cooler than your body, it is easier for your body to pass heat to the environment.

Workers on medications or with pre-existing medical conditions may be more susceptible to heat stress. These workers should speak to their personal physicians about work in hot environments.

Controlling Heat Stress

Acclimatization

The longer you work hard in the heat, the better your body becomes at adjusting to the heat. If you are not used to working in the heat then you should take a week or two to get used to the heat. This is called "acclimatization". If you are ill or away from work for a week or so you can lose your acclimatization.

There are two ways to acclimatize:

1. If you are experienced on the job, limit your time in hot working conditions to 50 per cent of the shift on the first day, 60 per cent of the shift on the second day, and 80 per cent of the shift on the third day. You can work a full shift the fourth day.

   If you are not experienced on the job (if you are, for example, a summer student), you should start off spending 20 per cent of the time in hot working conditions on the first day and increase your time by 20 per cent each subsequent day.

2. Instead of reducing the exposure times to the hot job, you can become acclimatized by reducing the physical demands of the job for a week or two.

If you have health problems or are not in good physical condition, you may need longer periods of acclimatization. Hot spells in Ontario seldom last long enough to allow acclimatization. However, exposure to workplace heat sources may permit acclimatization.

When it is hot, consider the following engineering and administrative controls.

Heat Stress Hazards

	Cause	Symptoms	Treatment	Prevention

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.	Wash regularly to keep skin clean and dry.
Sunburn	Too much exposure to the sun.	Red, painful, or blistering and peeling skin.	If the skin blisters, seek medical aid. Use skin lotions (avoid topical anaesthetics) and work in the shade.	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.
Heat Cramps	Heavy sweating drains a person's body of salt, which cannot be replaced just by drinking water.	Painful cramps in arms, legs or stomach which 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 cool salted water (1 tsp. salt per gallon of water) or commercial fluid replacement beverage. If the cramps are severe or don't go away, seek medical aid.	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.
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 if the person is conscious, offer sips of cool water. Fainting may also be due to other illnesses.	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.
Heat Exhaustion	Fluid loss and inadequate salt and water intake causes a person's body's cooling system to start to break down.	Heavy sweating; cool moist skin; body temperature over 38°C; weak pulse; normal or low blood pressure; person is tired and weak, and has nausea and vomiting; is very thirsty; or is panting or breathing rapidly; vision may be blurred.	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.	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.
Heat Stroke	If a person's body has used up all its water and salt reserves, it will stop sweating. This can cause body temperature to rise. Heat stroke may develop suddenly or may follow from heat exhaustion.	High body temperature (over 41°C) and any one 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.	CALL AMBULANCE. 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.	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.

Modifying Work and the Environment

Heat exposures may be reduced by several methods. Selection of appropriate workplace controls will vary, depending on the type of workplace and other factors. Some measures may include:

Engineering Controls

- Control the heat at its source through the use of insulating and reflective

barriers (e.g. insulate furnace walls).
- Exhaust hot air and steam produced by operations.
- Reduce the temperature and humidity through air cooling.
- Provide air-conditioned rest areas.
- Provide cool work areas.
- Increase air movement if temperature is less than 35°C (fans).
- Reduce physical demands of work task through mechanical assistance (hoists, lift-tables, etc.).

Administrative Controls

- The employer should assess the demands of all jobs and have monitoring and control strategies in place for hot days and hot workplaces.
- Increase the frequency and length of rest breaks.
- Schedule strenuous jobs to cooler times of the day.
- Provide cool drinking water near workers and remind them to drink a cup every 20 minutes or so.
- Caution workers to avoid direct sunlight.
- Assign additional workers or slow down the pace of work.
- Make sure everyone is properly acclimatized.
- Train workers to recognize the signs and symptoms of heat stress and start a "buddy system" since people are not likely to notice their own symptoms.
- Pregnant workers and workers with a medical condition should discuss working in the heat with their doctor.
- First Aid responders and an emergency response plan should be in place in the event of a heat-related illness.
- Investigate any heat-related incidents.

Personal Protective Equipment

- Light summer clothing should be worn to allow free air movement and sweat evaporation.
- Outside, wear light-coloured clothing.
- In a high radiant heat situation, reflective clothing may help.
- For very hot environments, air, water or ice-cooled insulated clothing should be considered.
- Vapour barrier clothing, such as chemical protective clothing, greatly increases the amount of heat stress on the body, and extra caution is necessary.

Managing Heat Stress from Process Heat

For an environment that is hot primarily due to process heat (furnaces, bakeries, smelters, etc.), the employer should follow the guidance of the American Conference of Governmental Industrial Hygienists (ACGIH) as outlined in its booklet and documentation for the recommended Threshold Limit Values (TLVs), and set up a heat stress control plan in consultation with the workplace's joint health and safety committee or worker health and safety representative.

Further information on the ACGIH TLVs, and on the development of heat stress

control plans, may be found at the following websites:

ACGIH
http://www.acgih.org/home.htm

U.S. Occupational Safety and Health Administration (OSHA)
http://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_4.html

Managing Heat Stress Induced by Hot Weather

Most workplaces don't have "hot processes" but working in hot weather can pose health risks to their workers. For hot work environments due to hot weather, a hot weather plan is appropriate. A hot weather plan is a simplified heat stress control plan. A hot weather plan should establish the implementation criteria, or "triggers", to put the plan into effect. The criteria may include:

Weather/environmental indicator triggers such as:

- Humidex reaching or exceeding 35º Celsius
- Environment Canada Humidex advisory (air temperature exceeding 30º Celsius and Humidex exceeding 40º Celsius) or Ontario Ministry of the Environment smog alert;
- Environment Canada weather reports; and/or
- Heat waves (three or more days of temperatures of 32º or more)

Generally, plans related to hot weather should be in place between May 1 and September 30 of each year.

The following websites have information on Humidex, Weather Reports and Smog Alerts:

Environment Canada
http://www.msc.ec.gc.ca/

Environment Canada Fact Sheet: Summer Severe Weather
http://www.on.ec.gc.ca/severe-weather/summer.html

Environment Canada Humidex Calculator
http://lavoieverte.qc.ec.gc.ca/meteo/Documentation/Humidex_e.html

Environment Canada Weather Office
http://www.weatheroffice.ec.gc.ca/canada_e.html

Air Quality Ontario Smog Advisories

http://www.airqualityontario.com/

Additional information on methods to monitor and manage workplace heat exposures may be found in the following resources:

Construction Safety Association of Toronto
http://www.csao.org/uploadfiles/magazine/vol11no2/heat.htm
http://www.csao.org/images/pfiles/251_heatstress-datasheet.pdf

The Canadian Centre for Occupational Health and Safety
http://www.ccohs.ca/oshanswers/phys_agents/heat_control.html
http://www.ccohs.ca/oshanswers/phys_agents/heat_health.html
http://www.ccohs.ca/oshanswers/phys_agents/hot_cold.html
http://www.ccohs.ca/oshanswers/phys_agents/humidex.html

City of Toronto
http://www.city.toronto.on.ca/health/beatheat.htm

U.S. Occupational Safety and Health Administration (OSHA)
http://www.osha.gov/SLTC/heatstress/
http://www.osha.gov/Publications/osha3154.pdf

Links to external websites are offered for the convenience of users in accessing related information. These links do not constitute an endorsement of the websites or their contents and the Ministry of Labour takes no responsibility for the views, contents or accuracy of the information presented by an external website.

Note:

Remember that while complying with occupational health and safety laws, you are also required to comply with applicable environmental laws.

For further information or assistance, please contact your local office of the Ministry of Labour, the Industrial Accident Prevention Association, the Construction Safety Association of Ontario or other safe workplace associations.

Produced by the Professional and Specialized Services of the Occupational Health and Safety Branch, Ministry of Labour.
ISBN #: 0-7794-3512-5
Date: April 2003

Disponible en français.

This site is maintained by the Government of Ontario, Canada.

External Links Disclaimer

Last modified: May 2, 2003 10:00