

NORTHWEST TERRITORIES & NUNAVUT

CODES OF PRACTICE

In accordance with the *Northwest Territories and Nunavut Safety Acts* and *Occupational Health and Safety Regulations*

THERMAL CONDITIONS



Workers' Safety
& Compensation Commission

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Code of Practice **THERMAL CONDITIONS**

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WHAT IS A CODE OF PRACTICE?

The Workers' Safety and Compensation Commission (WSCC) Codes of Practice (COP) provide practical guidance to achieve the safety requirements of the Northwest Territories and Nunavut Safety Acts and related Regulations.

Codes of Practice come into effect in each territory on the day they are published in the Northwest Territories Gazette and Nunavut Gazette.

Codes of Practice do not have the same legal force as the *Acts*, the *Mining Regulations*, or the *Occupational Health and Safety Regulations*. A person or employer cannot face prosecution for failing to comply with a COP. They are considered industry best practice and may be a consideration when determining whether an employer or worker has complied with the *Safety Acts* and *Regulations* in legal proceedings.

As per subsection 18(3) of the Northwest Territories and Nunavut *Safety Acts*, "For the purpose of providing practical guidance with respect to the requirements of any provision of this Act or the regulations, the Chief Safety Officer may approve and issue such codes of practice as he or she considers are suitable for that purpose."

Employers and workers should follow WSCC Codes of Practice unless there is an alternative course of action that achieves the same or better occupational health and safety outcomes.

A Code of Practice

- Provides practical guidelines.
- Adapts to individual work sites.
- May serve as evidence.
- Should be followed unless there's a better way.

Copies of this code are available online from the WSCC at: wsc. nt.ca or wsc. nu.ca
If you would like this code of practice in another language, please contact us.

FOREWORD

The Workers' Safety and Compensation Commission (WSCC) produced this industry Code of Practice in accordance with subsections 18(3) and 18(4) of the *Northwest Territories and Nunavut Safety Acts*.

The WSCC would like to thank all participating stakeholders for their contributions to the development of the *Northwest Territories and Nunavut Thermal Conditions Code of Practice*.

This Code is adapted from the *Alberta Best Practice – Working Safely in the Heat and Cold* as published by Work Safe Alberta. The WSCC gratefully acknowledges the work of OHS Policy and Program Development Branch, Workplace Standards Policy and Alberta Human Services.

The WSCC also acknowledges the Canadian Centre for Occupational Health and Safety (CCOHS), the Canadian Standards Association (CSA), the American Conference of Governmental Industrial Hygienists (ACGIH), Work Safe Saskatchewan, the Occupational Health and Safety Council of Ontario (OHSCO), the Ontario Ministry of Labour, Infrastructure Health and Safety Association (IHSA) and Environment Canada for information used in the Thermal Conditions Code of Practice.

The *Thermal Conditions* code relates to section 4 and 5 of the *Safety Acts*, and sections 74, 89, 90, 94, 95, 100, 101 and 109, 300 and 307 of the *Occupational Health and Safety Regulations*.

This code is in effect as published in the in the Northwest Territories *Gazette* and Nunavut *Gazette*, in accordance with the *Safety Acts and Occupational Health and Safety (OHS) Regulations*.

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Chief Safety Officer, WSCC

Disclaimer

This publication refers to obligations under the workers' compensation and occupational health and safety legislation as administered by the Workers' Safety and Compensation Commission.

To ensure compliance with legal obligations always refer to the most recent legislation. This publication may refer to legislation that has been amended or repealed.

Check for information on the latest legislation at wsc.nt.ca or wsc.nu.ca, or contact WSCC at 1-800-661-0792. or contact WSCC at 1-800-661-0792

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1 INTRODUCTION

This code of practice provides basic guidelines to mitigate the occupational health and safety risks associated with working in hot and cold conditions.

While many workplaces can benefit from this information, this code of practice is especially intended for people who work outdoors. Examples include road paving, construction, power line maintenance, and outdoor municipal work. The code of practice may, however, also be helpful to workplaces that have hot indoor environments such as kitchens, bakeries, pizzerias or workplaces with cold indoor environments like walk-in freezers, meat processing, or cold storage facilities.

The approach taken is the standard work site approach to potential hazards and involves hazard identification, risk assessment, control, implementation and monitoring.

1.1 Exposure to Heat and Cold

Many jobs in the North involve working in extremely cold temperatures. These jobs include winter road construction work and maintenance, air, ground and water transportation industries, working at mine sites or in the oil and gas industry, exploration work, municipal services such as delivering water and pumping sewage, and traditional jobs like hunting and trapping.

You must also prepare for extreme weather if you work indoors. You have to go to and from work, which includes spending some time outdoors. You may have to travel as part of your job. In the North, this often involves travel in light aircraft.

In the summer a lot of construction takes place in the North. Heat stress becomes a potential work hazard. Workers might also be exposed to very hot work environments when working beside hot equipment, furnaces, and processes that give off a lot of heat in a closed space.

You have to be ready for changes in the weather. Weather in the North can change quickly and often. Hypothermia is a year round concern in view of low water temperatures, and cold rains, coupled with wind. This makes it important to be continually aware of the effects of weather and the potential health and safety hazards.

2 BODY'S RESPONSE TO COLD AND HEAT

2.1 Core Temperature

Your body works best when it has an internal core temperature of 37°C. This temperature is necessary for vital organs to function normally. During a regular day, body temperature may vary by about 1°C depending on the time of day, level of physical activity and how you feel.

2.2 Maintaining Balance

When you work in extreme temperatures, your body has to adapt. To maintain a constant inner body temperature, the body must continually keep or gain heat in cold environments and lose heat in hot environments.

To stay warm in cold environments, the body:

- Shivers. The moving muscles help increase heat production.
- Reduces blood flow to the skin and extremities (hands and feet) to reduce heat loss from the surface.

To stay cool in hot environments, the body:

- Sweats. Evaporating sweat cools the body.
- Increases blood flow to the skin to speed up the loss of heat from the skin (radiate away the excess heat) if the outside air is cooler.

By sweating, shivering, and changing the rate of blood flow, the body can adapt to a fairly wide range of temperatures. However, there are limits to what the body can adapt to and its ability to maintain its core temperature can fail.

Guidelines and standards have been developed to provide information on how to best measure and control thermal exposure hazards.

3 THERMAL COMFORT

In *Part 6, Thermal Conditions*, section 74 of the *Occupational Health and Safety Regulations of the Northwest Territories and Nunavut* employers are required to: “provide and maintain thermal conditions, including air temperature, radiant temperature, humidity and air movement, that

- (a) are appropriate to the nature of the work performed;
- (b) provide effective protection for the health and safety of workers; and
- (c) provide reasonable **thermal comfort** for workers.”

Thermal comfort refers to a person’s feeling of comfort, as in not too hot or not too cold. It is important for both well-being and productivity. Workers under stress become less tolerant of uncomfortable thermal conditions.

Temperature preference also vary between people. Variability in metabolic rates, fitness levels, medical conditions, medication usage, ability to acclimatize, level of hydration and age makes achieving thermal comfort a challenge. This affects how people perceive thermal comfort levels, even if they are doing the same work in the same environment.

Factors Affecting Thermal Comfort

1. **Air temperature.** The air temperature can be measured with a thermometer. However, in situations where there is a lot of radiant heat such as direct sunlight, or machinery it is not always an accurate indication of how hot or cold you feel.
2. **Radiant temperature.** This describes how heat transfers between the body and other objects in the area. Sources can include direct sunlight, machinery that generates heat, hot water, heaters or open flames, furnaces or steam pipes. It is the process by which the body gains heat from surrounding hot objects or loses heat to cold objects such as chilled metallic surfaces – without contact with the surfaces. People are most sensitive to warm ceilings and cold vertical surfaces like windows.
3. **Solar loading.** This refers to the temperature at which thermal stress affect buildings and materials due to solar radiation depending on age, environmental conditions, time of the year, latitude and orientation of buildings or structures.
4. **Relative humidity.** The amount of moisture in the air affect how hot or cold people feel. The warmer the air, the more moisture it can hold. High humidity makes people feel hotter, because sweat does not evaporate off the skin. Cold air with high relative humidity feels colder than dry air at the same temperature. This is because high humidity in cold weather increases the loss of heat from the body to the surrounding air.

5. **Air speed (velocity).** Air movement usually cools a person. Air velocity can be created by a ventilation system or air conditioning system. This can provide cooling relief in a hot environment as long as the moving air is cooler than the individual. Drafts, especially around head, neck and feet can cause thermal discomfort. In cold situations, air movement can create wind chill and make you feel much colder than the temperature may indicate.
6. **Metabolic rate.** The number of occupants in a room and the amount of activity done, combined with clothing worn and radiant temperature influences thermal comfort.
7. **Physical exertion.** How hard you are working influences how hot or cold you feel. Moving around or working generates heat. When working on a very hot day, exertion increases heat stress.
8. **Clothing.** Type of clothing and work required clothing such as chemical protective clothing or cold weather gear affect thermal experience. The right clothing can help you stay warmer. However, when mist, rain or sweat is heavy enough to make your clothing wet, you feel colder. This happens because wet clothing loses its insulating properties.

Canadian Standard, CSA Z412-17 *Office Ergonomics – An application standard for workplace ergonomics* recommends the following for office temperatures:

- Summer conditions:
Optimum temperature of 24.5°C with an acceptable range of 23-26°C
- Winter conditions:
Optimum temperature of 22°C with an acceptable range of 20-23.5°C

Relative humidity levels **below 20%** can cause discomfort due to drying eyes and skin. Relative humidity levels **above 70%** may cause condensation and mould to develop.

Source: Canadian Centre for Occupational Health and Safety CCOHS (2018). [*Thermal Comfort for Office Work*](#)

4 ACCLIMITIZATION

People can adapt to different temperatures through a process called acclimatization. At the workplace, acclimatization is important because it allows you to work more safely and efficiently. However, becoming acclimatized takes time.

Acclimatization Process

Each person must be monitored to ensure he or she is adapting to working at different temperatures. When working in new conditions, people need at least four to seven working days to acclimatize, but the process may take up to three weeks.

A scheduled exposure is recommended and an employer should prepare an acclimatization plan according to exposure guidelines for new or experienced employees if cold or heat stress is a risk factor. More specific detail on acclimatization and recommended exposure guidelines are in each of the *Cold* and *Heat* sections.

Physical Conditions Affect Acclimatization

Every person is different. People who are in good health and physically fit tend to adjust faster and easier. However, some individuals may not be able to fully acclimatize regardless of their health or physical condition. People may also have an underlying condition, such as coming down with a flu or cold, which affects how their body reacts to the temperature.

Body weight, fitness level and age influence the body's ability to maintain a good internal temperature balance and affect responses to cold or heat.

Medical conditions can increase how susceptible the body is to heat and cold. People with heart disease, high blood pressure, respiratory disease and uncontrolled diabetes may need to take special precautions. People with skin diseases and rashes may be more susceptible to heat, while people with Raynaud's syndrome, also known as white finger disease, will be more affected by cold.

Medications also affect how you adapt. Check with your health practitioner to learn whether medications you are taking may have adverse effects under conditions of heat stress or cold stress. Psychoactive agents, such as antidepressants, can make people more susceptible to both heat and cold, whereas insulin and anti-thyroid drugs may cause more sensitivity to cold.

Substances impact how people react to heat and cold. Caffeine and smoking impact metabolic processes. Alcohol make people more susceptible to both heat and cold.

5 COLD

Cold is a physical hazard in many work sites. When the body is unable to warm itself, cold related illnesses and injuries happen. Exposure has mental and physical effects. Nowhere is this of greater concern than in Canada's Far North. The Northwest Territories and Nunavut are two of the coldest locations in Canada.

The coldest wind chill in Canada: January 13, 1975, at Kugaaruk, Nunavut. The air temperature was -51°C with 56 km/h winds, producing a wind chill of $-78!$

Source: Environment Canada (2014), [Wind Chill: The Chilling Facts](#)

Extreme cold and environmental factors related to working in northern locations are potentially hazardous to health and safety. It is necessary to identify the hazards, assess the potential risk to workers, and develop and implement controls to mitigate the hazards inherent with working in cold conditions.

It is important to plan and take precautions and always watch out for signs of unusual behaviours in yourself and co-workers. These are indicators the person is not coping well with the temperature and their condition should be investigated.

Indicators include:

Mental Changes

Loss of alertness, slurred speech, fatigue, lethargy or apathy.

Physical Responses

General discomfort and a loss of sensitivity and dexterity in fingers, hands and toes. At low temperatures, deep muscles can be affected, reducing muscle strength and flexibility.

Also important is to consider that measures taken to mitigate cold exposure harms may bring about other hazards, such as clothing caught in machinery or carbon monoxide (CO) poisoning when using heaters in vehicles or fuel burning equipment in an enclosed space to warm up from the cold.

6 COLD EXPOSURE SAFETY HAZARDS

Potential cold exposure safety hazards are listed below. The information is drawn from the Canadian Centre for Occupational Health and Safety (CCOHS) *Cold Weather Safety Guide* and many reputable cold weather information sources listed in the reference section. But the list may not cover all circumstances.

Assess Cold Exposure Hazards Specific to the Work Site and the Weather Conditions!

“Mild cold impairs nerve function and lessens sensation and manual dexterity. The critical air temperature for manual dexterity is 12°C and for touch sensitivity 8°C.”

Source: Work Safe Alberta (2014), pg. 52, [*Best Practice - Working Safely in Heat and Cold*](#)

- Cold affects dexterity, affecting skill and ease of using the hands.
- In the cold the mobility of fingers slows down, which affects task performance.
- Cold affects grip force and the skin's ability to sense temperature and pain.
- Cold exposure reduces muscle power and time to exhaustion.
- Cold exposure aggravates vibration, inducing white finger disease, which makes manual work painful.
- Extremely cold conditions adversely affect mental skills and coordination.
- Special care is needed while using ladders or working on elevated platforms in snow and icy conditions.
- Power tools and equipment need special care to be operational in a cold environment.
- Heavy snow fall and blizzards can produce very cold conditions and restrict visibility.
- Winter clothing, head protection, gloves and boots used while working in the cold can restrict movement and hoods or hats may obstruct side vision.
- PPE like safety goggles and face shield may fog up when required to use a covid-19 mask or when using a balaclava or face cover for protection against the cold.
- Use of heaters and or fuel burning equipment to prevent frostbite and hypothermia may cause carbon monoxide (CO) poisoning in enclosed space if not vented outside.
- Workers in remote areas need to take extra precautions and orient themselves to cold weather operations and emergency survival.
- Working on ice and frozen bodies of water require ice testing and knowledge of the ice bearing capacity.

7 HEALTH EFFECTS OF EXPOSURE TO COLD

Cold is a physical hazard. It is necessary to identify the hazards, assess the potential risk to workers, and develop and implement controls to mitigate the hazards inherent with working in cold conditions at a work site. ([See Chapter 8 - Cold Exposure Hazard Control](#))

Guidelines on first aid risk assessment in the [First Aid Kits Code of Practice](#) will help employers select: Quantity and type of first aid kits, and quantity and level of training of first aid attendants needed at the work site.

Chilblains

Chilblains, a mild cold injury, is caused by prolonged and repeated exposure for several hours to air temperatures ranging from 0°C to 16°C.

Signs: The affected area shows signs of redness, swelling, tingling, and pain.

Prevention & Cautions: Dress warmly. Follow occupational cold exposure guidelines. Chilblains will usually resolve. Seek medical help if an infection occurs.

Windburn

Windburn happens when the top layer of oil on the skin is removed by cold wind.

Signs: Considered a comparatively mild cold injury, resulting in dry, red, sore and itchy skin.

Prevention & Cautions: It is best not to scratch or rub the affected skin as that can damage the skin. Cover exposed skin. Dress in layers of warm clothing, with an outer layer that is wind-resistant.

Frostnip

Frostnip is the mildest form of a freezing cold injury. It occurs when ear lobes, noses, cheeks, fingers, or toes are exposed to the cold and the top layers of a skin freeze.

Signs: The skin of the affected area turns white and may feel numb. The skin feels hard but the deeper tissue still feels normal. The affected skin may peel.

Prevention & Cautions: Frostnip can be prevented by wearing warm clothing and foot wear. Cover exposed skin. Never rub the affected parts. Ice crystals in the tissue could cause damage if the skin is rubbed. Do not use very hot objects to rewarm the area or person.

Frostbite

Frostbite is a common injury caused by exposure to cold or by contact with cold objects and from contact with cooled or compressed gasses. It happens when fluids around the body's tissues freeze at temperatures below 0°C. The most vulnerable parts of the body are the nose, cheeks, fingers, ears and toes. Blood vessels may be severely and permanently damaged, and blood circulation may stop in the affected tissue.

Signs: In mild cases, symptoms include inflammation (redness and swelling) of the skin accompanied by slight pain. In severe cases, tissue damage without pain can happen. Frostbitten skin is highly susceptible to infection, and gangrene may develop. Symptoms of frostbite include:

- Coldness and tingling in the affected area followed by numbness.
- Burning or prickling sensations resulting in blisters.
- Changes in skin colour to white or greyish-yellow.

Prevention & Cautions: Dress very warmly in layers of clothing, with an outer layer that is wind-resistant. Follow occupational cold exposure guidelines. Never ignore numbness. If you feel numb or tingly, take steps to warm the area immediately (e.g. pull your arms into the inside of your jacket for more direct contact with the body).

- Do not rub area or apply snow.
- Avoid direct heat which can burn the skin.
- Seek medical help.

Immersion Foot

Immersion foot, like trench foot, results from prolonged exposure in a damp or wet environment, at temperatures ranging from 0°C to about 10°C, where the worker has wet feet for days or weeks. Depending on the temperature, symptoms may begin within several hours to many days, averaging three days. The primary injury is to nerve and muscle tissue.

Signs: Tingling and numbness; itching, pain, swelling of the legs, feet, or hands; or blisters may develop. The skin may be red initially and turn to blue or purple as the injury progresses. In severe cases, gangrene may develop.

Prevention & Cautions: Dress warmly. Wear insulated, waterproof footwear.

- Use a work warm-up schedule.
- Warm an exposed person by wrapping them in blankets or by them putting on dry clothing.
- Avoid direct heat which can burn the skin.
- Check for signs of hypothermia and seek medical attention.

Eye Protection

In extremely cold conditions, where face protection is used, eye protection must be separated from the nose and mouth to prevent exhaled moisture from fogging and frosting eye shields or glasses. If the eyes are not protected with goggles in high wind chill conditions, the corneas of the eyes may freeze.

When working outdoors in the winter, you may face exposure to snow blindness. This is normally a temporary loss of vision caused by exposure to bright sunlight reflected from snow or ice. It can occur on cloudy or overcast days or during snow storms. Snow blindness is painful, because the ultraviolet rays of the sun burns the cornea.

Signs of snow blindness include:

- Sensation of grit in the eyes.
- Pain in and over the eyes that increases with eyeball movement.
- Inflammation and red and teary eyes.
- Headache that intensifies with continued exposure to light.

Prevention & Cautions: In most cases, snow blindness lasts no more than one day, and goes away after a person relieves the fatigue of the retina by resting indoors and away from bright light. In rare cases, prolonged exposure to the reflected light can lead to permanent vision loss.

- Select protective eye wear that is appropriate for the work you are doing.
- Select for protection against ultraviolet light from the sun, glare from the snow, blowing snow/ice crystals, and high winds at cold temperatures.

Hypothermia

Hypothermia is a medical emergency. Seek medical help immediately.

The survival of the victim depends on their co-workers ability to recognize the symptoms of hypothermia. The victim is generally not able to notice his or her own condition. Any worker who was shivering, but has stopped shivering is at extreme risk for hypothermia! Do not assume that they are *“getting used to the cold”*.

Signs: Sensation of cold followed by pain in exposed parts of the body. Pain starts to diminish because of increasing numbness. Next, muscular weakness and drowsiness. Interruption of shivering, diminished consciousness and dilated pupils. ([Also see pg.16](#))

Prevention:

Dress very warmly in layers of clothing, with an outer layer that is wind-resistant. Follow occupational cold exposure guidelines.

Cautions:

- Move the person out of the cold, and/or insulate the person.
- Handle the person gently. Do not massage or rub the skin.
- DO NOT rewarm the person too quickly (e.g. soak in a hot bath/shower).
- Perform CPR (cardiopulmonary resuscitation) if the person stops breathing.
 - Continue to provide CPR until medical aid is available.
 - The body slows when it is very cold and in some cases, hypothermia victims that have appeared "dead" have been successfully resuscitated.

For more information on *Emergency First Aid* see:

- Government of Alberta, 2014, [Best Practice - Working Safely in Heat and Cold](#)
- Employment and Social Development Canada, 2018, [Thermal Stress in the Work Place](#)
- Canadian Centre for Occupational Health and Safety (CCOHS), 2021, [Cold Environments - Health Effects and First Aid](#)
- Canadian Red Cross, 2021, [Cold-Related Emergencies: Staying Warm and Safe in Canadian Winters](#)

HYPOTHERMIA		
Stage	Core Temperature	Signs and Symptoms
Mild Hypothermia	37.2-36.1°C	Normal, shivering may begin.
	36.1-35°C	Cold sensation, goose bumps, unable to perform complex tasks with hands, shivering can be mild to severe, hands numb.
Moderate Hypothermia	35-33.9°C	Intense shivering, muscle incoordination becomes apparent, slow and labored movements, stumbling pace, mild confusion, may appear alert. Use sobriety test; if a person is unable to walk a 9 metre straight line, the person is hypothermic.
	33.9-32.2°C	Violent shivering persists, difficulty speaking, sluggish thinking, amnesia starts to appear, gross muscle movements sluggish, unable to use hands, stumbles frequently, difficulty speaking, signs of depression, and a person may appear withdrawn.
Severe Hypothermia	32.2-30°C	Shivering stops, exposed skin blue or puffy, muscle coordination very poor, inability to walk, confusion, incoherent/irrational behaviour, but may be able to maintain posture and appearance of awareness.
	30-27.8°C	Muscle rigidity, semiconscious, stupor, loss of awareness of others, pulse and respiration rate decrease, possible heart fibrillation.
	27.8-25.6°C	Unconscious, erratic heartbeat and respiration erratic, pulse may not be obvious.
	25.6-23.9°C	Pulmonary edema, cardiac and respiratory failure, death. Death may occur before this temperature is reached.

8 COLD EXPOSURE HAZARD CONTROL

Hazard assessment determines measures be taken to reduce potential harm to workers. An employer usually follows the hazard control hierarchy as outlined in the [Hazard Assessment Code of Practice](#).

However, when the hazard is an outdoor environmental condition, eliminating the hazard is not possible. Work cannot always cease in the Far North when cold weather is a reality for the majority of the year. Mitigating hazards therefore becomes very important, especially under extreme cold weather conditions. The risk of cold injury may be reduced with proper equipment design, safe work practices, worker training on cold weather risks and use of appropriate clothing.

Most important! Stay aware of symptoms of cold exposure in yourself and your co-workers. Workers showing signs of shivering, frostbite, fatigue, drowsiness, irritability, or euphoria should immediately return to the shelter.

8.1 Engineering Controls

- **Use controls** for warm up such as warming enclosures and heating systems.
- **Shield work areas** from cold air and wind chill as much as possible.
- **Provide a heated shelter** for workers to work in where possible, but at minimum as a shelter for work warm-up breaks.
- **Protect the hands, face, and feet** from frostbite with an on-site source of heat. Consider air heaters, radiant heaters, or contact warm plates.
- **Heaters that emit carbon monoxide should be used with caution.** Make sure the area is ventilated and equipment is in good condition.
- **Use thermal insulating material** on equipment, such as metal handles. Use insulating barrier/pads where workers sit, kneel or stand on concrete or steel.
- **Use machines and tools designed for cold conditions** to be operated without needing to remove mittens or gloves.
- **Use a spill or splash guard when handling gasoline.** With a freezing point of -56°C and a high evaporation rate, contact with the skin can be very dangerous.

Equipment is prone to break down at extreme temperatures. Safety harnesses are tested to comply with standards ranging down to -35°C only.

Source: CSA Standard, Z259.2.5-12 (4.2.3) (2012), *Fall Arresters and Vertical Lifelines*

8.2 Administrative Controls

- **Follow occupational cold exposure guidelines** as much as possible.
- **Use a work warm-up schedule.** Provide a warm shelter or vehicle to warm up.
- **Monitor temperature and wind speed** every four hours and record findings.
- **Allow a period of adjustment** to the cold before assigning a full work schedule.
- **Train and prepare workers** about the hazards of working in a cold environment.
- **Minimize time outdoors** and do as many tasks indoors as possible.
- **Minimize inactive behavior** requiring sitting or standing for long periods of time.
- **Ensure backup** for workers in isolated cold environments, indoor or outdoor.
- **Provide high calorie nutrition and warm drinks** to keep energy levels up.
- **Ensure emergency procedures** for getting first aid and medical care is clear.

8.3 Personal Protective Equipment

Select personal protective equipment based on weather circumstances, job and task at hand and level of physical activity. Occupations have different requirements for workers. For instance, in the oil and gas industry specialized outerwear, such as fire retardant materials, may be required. Follow manufacturer's guidelines for use and maintenance of PPE in cold conditions.

Cold Work Clothing

Protect head, face and hands to prevent heat loss and frostbite. Use the appropriate hardhat liner with face shield or facemask or balaclava.

Wear several layers of clothing rather than one thick layer. Multiple layers of clothing help create air pockets that retain body heat. Layering also makes adapting to changes in weather and level of physical exertion easier, because you can remove layers and put them back on as conditions and work effort change.

Example of three layers:

1. An outer layer that is windproof, but still allows some ventilation.
2. A middle layer of wool, quilted fibers or synthetic fleece as insulating layer.
3. An inner layer of synthetic fabric or wool to provide ventilation and allow moisture to escape. Wear synthetic fabrics such as polypropylene next to the skin and not cotton. Cotton stays damp and speeds heat loss.

- **Remove the outer layer** of clothing when entering a shelter from the cold and loosen other clothing to let sweat evaporate. A change of clothing may be necessary as sweat dampened clothes lose their insulation value.
- **Remove layers** as you begin to sweat to avoid losing insulation value, but don't forget to put them back on when you stop working. Don't wait until you get cold.
 - Start by opening your jacket
 - Next, remove one or more layers of clothing
 - Remove gloves or mittens, unless protection is needed from snow and ice or other hazards of work.

Examples of Cold Weather Clothing	
Clothing	Type
Long underwear	Wool, silk, synthetic fabric.
Pants	Wool, synthetic fabric.
Shirts, sweaters, turtlenecks	Wool, fleece, synthetic fabric.
Head gear	Wool, synthetic fabrics, wind barrier fabric if necessary.
Gloves, mittens	Loose fitting with wool or synthetic fabric liners, gloves inside mittens plus windproof overmitts for extremely cold conditions.
Socks	Two pairs - light or medium inner and heavy wool or synthetic outer socks.
Parka or Jacket	Loose fitting, filled with down or insulating fibre, attached hood, outer layer of windproof fabric.

Hand Protection

Hands are especially vulnerable to cold injury. Fingers are the most commonly affected body parts affected by frostbite, exposure to severe cold and contact with extremely cold objects. Manual dexterity is also crucial for safe work practices and safe operation of machinery.

To select the best hand protection for cold work, several factors should be considered: the weather, the thermal profile of the gloves, the type of work or task, and the level of dexterity required, bearing in mind the extent to which cold reduces dexterity.

A wide range of gloves are available offering cut resistance and resistance to oil, moisture, sharp surfaces, welding arc flash, vibration absorption, improved grip along differing levels of performance associated with cost, comfort, dexterity, durability and warmth. Additional features are extended sleeves for additional protection or to seal heat leaks where the sleeve meets the glove or mitt.

For example; Gloves have been designed for using with circular saws in the cold, made of tough, synthetic warp-knitted material of such high tensile strength that on contact with a spinning chain it immediately snags the winding action, bringing the chain to a stop and mitigating potential injury.

Wear mittens instead of gloves when fine manual work is not required, or gloves with nylon over-mitts that can be taken off. Arctic gauntlet mitts are advisable. Cold protection requires a water resistant membrane with insulated lining.

INFORMATION FOR HAND PROTECTION
Fine work performed with bare hands for more than 10-20 minutes in an environment below 16°C requires special measures to keep workers' hands warm. These measures may include warm air jets, radiant heaters (fuel burning or electric), or contact warm plates.
Metal handles of tools and control bars should be covered by thermal insulating material for temperatures below -1°C.
Tools and machine controls to be used in cold conditions should be designed for operation by gloved hands.
To prevent contact frostbite, workers should wear insulated gloves when surfaces within reach (especially metallic surfaces) are colder than -7°C. Warn workers to avoid skin contact with these surfaces.
Workers should wear gloves where fine manual dexterity is not required and the air temperature falls below 16°C for sedentary, 4°C for light, and -7°C for moderate work.

Source: Infrastructure Health and Safety Association (IHSA), *Construction Health and Safety Manual 7-4*

Protective Footwear

Use safety footwear that protects against the cold and dampness. Felt-lined, rubber bottomed, leather topped boots with removable felt insoles are best suited for heavy work in cold since leather is porous and allows for perspiration to evaporate. However, if work involves standing in water or slush, waterproof boots need to be worn. Waterproof boots protect the feet from getting wet, but since they prevent perspiration from escaping socks may become damp quicker and increase the risk for frostbite.

Footwear should be insulated and fit comfortably when socks are layered. Tight fitting footwear restricts blood flow. Arctic rated winter boot are advisable. Boots made of ballistic nylon offer the best protection against cuts. Rubber soles are suited to wet weather and snow, and hobnail boots, grip soles, or cork soles to rough terrain.

9 COLD EXPOSURE GUIDELINES

A cold environment challenges the worker in three ways:

- Air temperature
- Air movement (wind speed)
- Humidity (moisture)

In order to work safely these challenges have to be counterbalanced by proper insulation, such as layered protective clothing, physical activity, and controlled exposure to cold through a work warm-up schedule.

Manufacturer's Guidelines need to be checked to ensure worker safety with use of equipment under conditions of extreme cold. This code focuses on the human factor and does not address the parameters of safe equipment usage.

Occupational Exposure Guidelines can be used to help protect workers from cold induced illness. The American Conference of Governmental Industrial Hygienists (ACGIH) provides various guidelines to exposure limits. The ACGIH adopted guidelines developed by Saskatchewan Labour for working outdoors in cold weather conditions.

A Wind Chill Index is the tool used to evaluate the impact of cold for application of exposure guidelines. The [Canadian Wind Chill Index](#) is based on research and medical and computer advances in Canada reflecting better understanding how the body loses heat when exposed to cold. It is a measurement of the heat loss rate resulting from exposure to wind and reflects the degree of cold the skin senses.

“Exposed human flesh freezes within one minute at -29°C (-20°F) when wind speed is 8 km/h (5 mph). When the wind speed increases to 32 km/h (20mph) human flesh will freeze at -12°C (+10°F).”

Source: *Cold Weather Safety Guide*, 3rd Edition, p.13, Canadian Centre for Occupational Health and Safety (CCOHS), 2005. Reproduced with permission of CCOHS, 2012

10 OCCUPATIONAL EXPOSURE GUIDELINES

Exposure limits provide useful guidelines to help control worker exposure to cold, but an exposure limit alone cannot be used to assess the hazard. Cold exposure limits do not account for variations in the characteristics of workers such as the effects of medication. All aspects of the potential hazards and risks should be considered in a hazard assessment.

In the North limited-duration tasks, for example servicing an aircraft or re-establishing power supply, may be needed at extreme temperatures. When doing any work at extreme temperatures, whether emergency or other work, assess the cold hazards and take reasonable precautions to ensure the health and safety of workers.

10.1 Working in Cold Conditions

Occupational exposure guidelines, such as a work warm-up schedule provides guidance to help ensure worker health and safety under cold conditions. The work warm-up schedule on the following page shows the warm-up breaks suggested for work in cold conditions in addition to normal breaks provided every two hours. The schedule applies to moderate to heavy physical work activity with an extended break in a warm location at the end of a four-hour period. The guideline assumes warm-up breaks of 10 minutes in a warm environment and applies to workers wearing dry clothing.

10.2 Application of Cold Exposure Guidelines

Example:

A work crew is working outside on a -25°C day in March. They are installing corrugated sheet metal roofing on a school gymnasium roof. The morning radio reported a general wind chill of -33 with little wind. In the afternoon the temperature drops to -29°C and the wind picks up. Workers see the flag fully extended and estimate the wind to now be between 16 and 20 km/h.

Action:

Since the temperature had dropped and wind speed has picked up workers decide the wind chill value is higher than reported on the radio in the morning. They decide to use a work warm-up schedule matching the temperature of -29 to -31°C at 16-24 km/h. This comes to a maximum of 55 minutes of work, with 3 breaks, in a 4-hour shift.

10.3 Cold Work Warm-Up Schedule

Work Warm-up Schedule for Outdoor Work Activities										
Air Temp. Sunny	Wind Not Noticeable		Wind 8 km/h		Wind 16 km/h		Wind 24 km/h		Wind 32 km/h	
° C (Approx.)	Max Work Period	Number of Breaks*	Max Work Period	Number of Breaks*	Max Work Period	Number of Breaks*	Max Work Period	Number of Breaks*	Max Work Period	Number of Breaks*
-26° to -28°	120 mins	1	120 mins	1	75 mins	2	55 mins	3	40 mins	4
-26° to -28°	120 mins	1	75 mins	2	55 mins	2	40 mins	4	30 mins	5
-32° to -34°	75 mins	2	55 mins	3	40 mins	4	30 mins	5	Non-emergency work should cease	
-35° to -37°	55 mins	3	40 mins	3	30 mins	5	Non-emergency work should cease			
-38° to -39°	40 mins	4	30 mins	5	Non-emergency work should cease					
-40° to -42°	30 mins	5	Non-emergency work should cease				Non-emergency work should cease			
-43° and below	Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease	

Mins = Minutes

Source: Work Safe Saskatchewan (2020), [Working in Cold Conditions](#)

Special considerations:

- If effective wind protection is provided 'Wind not noticeable' schedule applies.
- For workers with limited physical activity apply the schedule at one step lower.
- For isolated work sites arrange a buddy system or reliable two-way communication.
- Occupational Exposure Limits and Guidelines are based on an 8-hour exposure with 16 hours of rest (non-exposure). Methods for determining exposure levels for an extended workday should be used with caution.

Green Zone – Work as Usual

- Dress appropriately for the weather.

Yellow Zone – Work with Precautions

- Provide 10 minute breaks in a warm area as per work time listed in the table.
- Increase task rotations and reduce periods of extended sitting or standing.
- Weather appropriate PPE may be required and portable heating devices.
- If workers get wet, dry clothing and a warm change area must be available.
- Monitor weather, wind and temperature for change at least every 4 hours.

Red Zone – Only Emergency Work!

11 WIND CHILL

Wind speed is an important factor in cold exposure hazard assessment. On a calm day, our bodies insulate us to an extent from the outside temperature by warming up a thin layer of air close to our skin. This is known as the boundary layer. When the wind blows, it takes this protective layer away, exposing our skin to the outside air. It takes energy for our bodies to warm up a new layer and if each layer keeps getting blown away our skin temperature will drop and we will feel colder.

Wind also makes us feel colder by evaporating moisture on the skin, a process that draws more heat away from the body. Studies show that when skin is wet, it loses heat much faster than when it is dry. Wind chill is the mathematical calculation of how the air temperature feels on exposed skin due to wind.

[Access Environment Canada's Wind Chill Calculator here.](#)
Enter air temperature and wind speed for an instant wind chill calculation.

11.1 Wind Chill Warnings and Adaptation

In most of Canada, forecasted temperatures include wind chill when it reaches -25°C . The risk of frostbite increases fast when wind chill drops below -27°C .

In sustained winds over 50 km/h, frostbite can occur faster than indicated. In parts of the country with a milder climate, such as southern Ontario and the Atlantic province (excluding Labrador), Environment Canada issues a wind chill warning at about -35°C .

Further north, people have grown more accustomed to the cold, and have adapted to the more severe conditions. Because of this, Environment Canada issues warnings at progressively colder wind chill values as you move north. Most of Canada, including western Canada and northern Ontario receives a wind chill warning at about -45°C .

Residents of the Arctic, northern Manitoba and northern Quebec receive warnings at about -50°C , and those of the high Arctic at about -55°C .

How to Estimate Wind Chill

By using the wind speed estimation guide on the next page and comparing this to the temperature guide on the same page it is possible to determine wind chill.

11.2 Wind Chill Calculation Chart

Wind Chill for Temperatures Ranging from + 5 to - 50 °C												
Wind Km/h ***	°C 5	°C 0	°C - 5	°C -10	°C -15	°C -20	°C -25	°C -30	°C - 35	°C -40	°C -45	°C -50
5	4	-2	-7	-13	-19	-24	-30	-36	-41	-47	-53	-58
10	3	-3	-9	-15	-21	-27	-33	-39	-45	-51	-57	-63
15	2	-4	-11	-17	-23	-29	-35	-41	-48	-54	-60	-66
20	1	-5	-12	-18	-24	-30	-37	-43	-49	-56	-62	-68
25	1	-6	-12	-19	-25	-32	-38	-44	-51	-57	-64	-70
30	0	-6	-13	-20	-26	-33	-39	-46	-52	-59	-65	-72
35	0	-7	-14	-20	-27	-33	-40	-47	-53	-60	-66	-73
40	-1	-7	-14	-21	-27	-34	-41	-48	-54	-61	-68	-74
45	-1	-8	-15	-21	-28	-35	-42	-48	-55	-62	-69	-75
50	-1	-8	-15	-22	-29	-35	-42	-49	-56	-63	-69	-76
55	-2	-8	-15	-22	-29	-36	-43	-50	-57	-63	-70	-77
60	-2	-9	-16	-23	-30	-36	-43	-50	-57	-64	-71	-78
65	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79
70	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-80
75	-3	-10	-17	-24	-31	-38	-45	-52	-59	-66	-73	-80
80	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81

Source: Canadian Centre for Occupational Health and Safety (CCOHS). (2019), [Cold Environments – Working in Cold](#) as adapted from *Threshold Limit Values (TLV) and Biological Exposure Indices (BEI)*, ACGIH, pg. 222, 2018.

11.3 Wind Speed Estimation

Wind Speed	Estimating Wind Speed
10 km/h	Wind felt on face – wind vane begins to move.
20 km/h	Small flags extended.
30 km/h	Wind raises loose paper, large flags flap and small tree branches move.
40 km/h	Small trees begin to sway and large flags extend and flap strongly.
50 km/h	Large branches of trees move, telephone wires whistle and hard to use umbrella.
60 km/h	Trees bend and walking against wind is hard.

Source: Environment Canada (2017), [Wind Chill Index](#)

11.4 Wind Chill Frost Bite Risk

Wind Chill Range	Frost Bite Risk
4 to 9°C	Low risk of frostbite for most people.
-10 to -27°C	Moderate risk of frostbite if outside for long periods without protection.
-28 to -39°C	High risk of frostbite. Skin can freeze in 10 - 30 minutes of exposure.
-40 to -47°C	Very high risk of frostbite. Skin can freeze in 5 - 10 minutes of exposure.
-48 to -54°C	Severe risk of frostbite. Skin can freeze in 2 - 5 minutes of exposure.
-55 and colder	Extreme risk of frostbite. Skin can freeze in under 2 minutes of exposure.

11.5 Wind Chill Hazard Controls and Clothing

Wind Chill	Exposure Risk	Health Concerns	What to do
0 to -9 °C	Low Risk	Slight increase in discomfort.	Dress warmly. Stay dry.
-10 to -27 °C	Moderate Risk	-Uncomfortable -Risk of hypothermia and frostbite if outside for long periods without adequate protection.	-Dress in layers of warm clothing, with an outer layer that is wind-resistant. -Wear a hat, mittens or insulated gloves, a scarf and insulated, waterproof footwear. -Stay dry. Keep active.
-28 to -39 °C	High Risk: exposed skin can freeze in 10 to 30 minutes.	-High risk of frostnip or frostbite: Check face and extremities for numbness or whiteness. -High risk of hypothermia if outside for long periods without adequate clothing or shelter from wind and cold.	-Dress in layers of warm clothing, with an outer layer that is wind-resistant. -Cover exposed skin. Wear a hat, mittens, a scarf, neck tube or facemask and insulated, waterproof footwear. -Stay dry. Keep active.

-40 to -47 °C	Very High Risk: exposed skin can freeze in 5 to 10 minutes.	-Very high risk of frostbite: Check face and extremities for numbness or whiteness. -Very high risk of hypothermia if outside for long periods without adequate clothing or shelter from wind and cold.	-Dress in layers of warm clothing, with an outer layer that is wind-resistant. -Cover all exposed skin. Wear a hat, mittens or insulated gloves, a scarf, neck tube or face mask and insulated waterproof footwear. -Stay dry. Keep active.
-48 to -54 °C	Severe Risk: exposed skin can freeze in 2 to 5 minutes.	-Severe risk of frostbite: check face and extremities for numbness or whiteness. -Severe risk of hypothermia if outside for long periods without adequate clothing or shelter from wind and cold.	-Be careful. Dress very warmly in layers of clothing, with an outer layer that is wind-resistant. -Cover all exposed skin. Wear a hat, mittens or insulated gloves, a scarf, neck tube or face mask and insulated waterproof footwear. -Be ready to cut short or cancel outdoor activities. -Stay dry. Keep active.
-55 °C and colder	Extreme Risk: exposed skin can freeze in less than 2 minutes.	DANGER! Outdoor conditions are hazardous.	Stay indoors.

Source: Environment Canada (2017), [The Risks of Wind Chill and What to Do](#)

12 HEAT

Working in hot conditions puts stress on the body's cooling system. Heat combined with exertion, loss of fluids and fatigue may cause heat stress. Heat strain is the overall response of the body resulting from heat stress. It can cause a wide variety of health disorders. Heat stroke is a serious health risk. Heat-related illnesses depend on many workplace factors, such as air temperature, relative humidity, workload, radiant heat sources and physical condition.

Heat exposure can have mental and physical effects. Watch for signs of unusual reactions in yourself and co-workers. These are indicators the person is not coping well with the temperature and their condition should be investigated.

Indicators include:

Mental Changes

Increased irritation, mood changes, depression, aggression, and anger.

Physical Responses

Increased heart rate and sweating, muscle cramps, changes in breathing patterns, dizziness, faintness, or heat rash.

Brain cells are extremely sensitive to heat. An increase of a few degrees in blood temperature can have a big effect on brain function. A core temperature of 42 °C is all brain cells can tolerate.

Source: Work Safe Alberta. (2014), pg. 52, [Best Practice - Working Safely in Heat and Cold](#)

13 HEALTH HAZARDS OF EXPOSURE TO HEAT

It is necessary to identify the hazards, assess the potential risk to workers, and develop and implement controls to mitigate the hazards inherent with working in hot conditions. ([See Chapter 14 - Heat Exposure Hazard Control](#))

Guidelines on first aid risk assessment in the [First Aid Kits Code of Practice](#) will help employers select: Quantity and type of first aid kits and quantity and level of training of first aid attendants needed at the work site.

Heat Stress

Early symptoms of heat stress include fatigue, irritability, lack of coordination, and altered judgment. The combination of heat stress and dehydration means people performing skilled tasks may become tired faster than normal, and have trouble concentrating. This results in a higher risk for errors.

If someone shows signs of heat stress, assume that other workers may also be affected. Workers should report to a cool area for individual assessment before work continues.

Early Warning Signs	As Heat Stress Worsens
Headache	Breathlessness
Dizziness / faintness	Weak rapid pulse
Irritability / anger / mood change	Severe headache
Fatigue	Severe muscle cramps
Heavy sweating	Confusion
Prickly heat (heat rash)	Skin from cold and clammy to hot and dry
Muscle cramps	Severe dehydration
Changes to breathing and pulse rate	Sweating may stop
Dehydration	Coma and possible death

Dehydration

The body through the natural mechanism of sweating attempts to regulate itself and remove excess heat. This causes dehydration and loss of salt from the body.

Dehydration causes a reduction of blood volume in the body and disrupts normal blood pressure. When prolonged it can cause muscle cramps, gastrointestinal problems and fainting. Dark urine is often an indication of the onset of dehydration.

Heat Rashes

This is a common effect of work in a hot environment. Tiny red spots on the skin cause a prickling sensation and mostly occurs in the areas of the body where sweat is unable to dry such as neck, elbow creases, groin and breast areas.

Heat Cramps

Painful muscle spasms that occur during strenuous activity in hot environments. Associated with cramping in the abdomen, arms and calves, the muscle pains may occur alone or in combination with another heat stress disorder. Inadequate consumption of fluids or electrolytes often contributes to heat cramps.

Heat Exhaustion

A break down in the body's cooling system resulting from fluid loss and inadequate water intake. Blood volume falls and the heart is not able to keep up with demand as the body gets more and more dehydrated. Acute symptoms include heavy sweating, panting, weakness, dizziness, nausea, vomiting, headaches and fast heart beat. Chronic heat exhaustion has psychological health effects can cause increased risk for kidney stones and gastrointestinal diseases.

Heat Syncope

Heat-induced giddiness and fainting induced by temporary insufficient blood flow to the brain while a person is standing. It occurs mostly among unacclimatized people and results from loss of body fluids through sweating, and lowered blood pressure from blood pooling in the legs.

Heat Edema

Heat edema can cause swollen hands or feet and ankles when people sit or stand for a long time in a hot environment. Heat causes the blood vessels to expand (dilate) and body fluid moves into the hands or legs.

Hyponetremia

Hyponetremia is caused by dehydration and loss of salts and unequal water and salt distribution in the body. Loss of salt through excessive sweating or drinking too much water without enough salts can cause hyponetremia to various degrees. It is not always severe, but severe symptoms include pulmonary edema, respiratory distress and result in death.

Rhabdomyolysis

The condition is identified as tissue injury in the muscle caused by prolonged and extreme exertion of muscles and high body temperature, and other factors like medication or use of drugs or supplements that reduce blood to muscles or injure muscles. Symptoms can include pain and cramps, dark urine and weakness or inability of exertion, nausea, vomiting, confusion and abdominal pain.

Chronic Illness Resulting from Heat Exposure

Damage to the eye, in particular the lens, from radiant heat and infrared radiation. Occupations at risk for this type of eye damage include glass manufacturing, foundries, ceramics, bakeries, and outdoor activities in brilliant sunshine without sunglasses, particularly at high elevations. Other potential health effects include chronic heat exhaustion, sleep disturbances, and susceptibility to minor injuries.

Source: Employment and Social Development Canada. (2018), [Thermal Stress in the Work Place](#)

Heat Stroke / Hyperthermia

This is the most fatal heat stress illness. Hyperthermia is an extreme temperature elevation can become a medical emergency requiring immediate treatment to prevent disability and death. Heat stroke is caused by a combination of exposure to excessive heat, or heat and humidity, or excessive exertion and inefficient removal of heat from the body through metabolic processes. The body's heat-regulating mechanisms become overwhelmed and the body is unable to regulate the core body temperature in the central nervous system.

Symptoms include loss of consciousness, fainting, high body temperature, flushed skin and increased sweating. The risk for organ failure and death is very high as internal body systems are unable to recuperate after severe heat damage.

A heat stroke victim is usually unable to recognize the heat stroke signs and symptoms. Survival depends on a co-worker's ability to recognize the symptoms and seek immediate help. Delayed treatment may result in damage to the brain, kidneys and heart.

“Heat stroke is a life-threatening situation and requires immediate first aid and medical attention.”

Source: Work Safe Alberta. (2014), pg.16, [Best Practice - Working Safely in Heat and Cold](#)

For more information on *Emergency First Aid*:

- Canadian Centre for Occupational Health and Safety (CCOHS), 2016, [Environments - Health Effects and First Aid](#)
- Canadian Red Cross, 2021, [Heat-Related Emergencies: Staying Cool and Hydrated in Canadian Summers](#)
- Employment and Social Development Canada, 2018, [Thermal Stress in the Work Place](#),
- Government of Alberta, 2014, [Best Practice - Working Safely in Heat and Cold](#), 2014.
- Health and Safety Council of Ontario (OHSCO), 2007, [Heat Stress Awareness Guide](#)
- Work Safe Saskatchewan, 2020, [Working under Hot Conditions](#).

Heat Stress Hazards

Effect	Severity
Heat Rash	Red bumpy rash with severe itching.
Fainting	Sudden fainting after at least two hours of work; cool moist skin; weak pulse.
Heat Cramps	<p>Heat cramps are painful, involuntary muscle spasms that usually occur during exertion in hot environments. The cramps is caused by failure to replace fluids and salts lost as result of heavy sweating.</p> <p>The spasms may be more intense and more prolonged than typical leg cramps. Muscles most often affected include the calves, arms, abdomen and back.</p>
Heat Exhaustion	<p>Signs and symptoms of heat exhaustion often begin suddenly, sometimes after excessive exercise, perspiration and inadequate fluid intake.</p> <p>Features resemble shock and include: cool moist skin, body temperature above 38°C, weak pulse, heavy sweating, panting, weakness, dizziness, nausea and vomiting, and blurred vision.</p>
Heat Stroke	<p>The main sign of heatstroke is a markedly elevated temperature, generally greater than 40°C.</p> <p>Skin becomes hot, dry and red.</p> <p>The affected person may act strange, weak and confused.</p> <p>Other signs may include: dizziness, headache, rapid heartbeat, shallow breathing, elevated or lowered blood pressure, cessation of sweating.</p> <p>In a later stage a person may pass out or have convulsions.</p>

NOTE:

- Immersing a person in cold water can result in harmful overcooling.
- Do not use rubbing alcohol.
- Do not give liquids with alcohol or caffeine.

14 HEAT EXPOSURE HAZARD CONTROL

If a hazard assessment requires measures be taken to reduce the potential for harm to workers, the employer should follow the hazard control hierarchy as outlined in the [Hazard Assessment Code of Practice](#)

14.1 Heat Exposure Hazard Control Hierarchy

1. Explore ways to **eliminate** the hazard.
2. Reduce exposure by applying **engineering controls** such as methods of designing or modifying plants, equipment, ventilation systems, and processes to reduce exposure.
3. Apply **administrative controls** such as work practices, standards and operating procedures including training, timing of work, policies and other rules to reduce exposure.
4. Use **personal protective equipment** if necessary as a last resort.
5. Use a combination of engineering controls, administrative controls or personal protective personal equipment if this results in a greater level of worker safety.

The best way to control a hazard is to eliminate it. This step is impracticable when the hazard is an outdoor environmental condition. The measures for control, therefore, should focus on engineering and administrative controls, and personal protective equipment.

14.2 Engineering Controls

Use labour saving devices to reduce the level of physical activity required to lower the body's metabolic heat production. Examples are; carts, conveyors, or mechanical lifting devices.

Change the location of the work to a cooler work area if possible. Determine if some or all of the work can be done in the shade, or in a ventilated or air-conditioned space. For example, load vehicles inside a cooled warehouse, or provide a shade shelter for groundskeepers.

Establish a cooling station where workers can rest in a ventilated and air-conditioned space such as a booth, vehicle, or tent.

Reduce radiant heat emission from hot surfaces to reduce heat exchange into the environment.

Shield or screen to stop radiated heat from reaching work stations. Bright surfaces like stainless steel and aluminum reflect heat back to the source and absorbent shields made of black-surfaced aluminum absorb heat.

Indoor Environments

- **Use fans** to increase air movement and help encourage sweat evaporation. This control method is only effective when the air temperature is less than the skin temperature (about 35°C).
 - When hot air is blown on a person, heat exhaustion can happen faster.
- **Remove heat sources** from work areas through isolation, relocation, redesign or substitution.
- **Reduce humidity** with air conditioning and dehumidification and eliminating open hot water areas, drains and leaky steam valves.
- **Use ventilation and air conditioning** to cool the entire workplace.
- **Implement spot cooling** for hot areas and work sites.
- **Use local exhaust** to remove heat from hot work processes.
- **Cover or contain heat sources** such as steaming tanks.
- **Automate or replace** hot processes.
- **Rotate workers** in and out of hot work areas whenever possible.

14.3 Administrative Controls

- **Reduce physical effort needed for a task by:**
 - lowering the pace or intensity of work
 - shortening the duration of work
 - increasing the number and/or length of rest breaks
 - substituting light tasks for heavy ones
 - increasing the number of staff to share the workload
- **Provide adequate supplies of drinking water.** Encourage workers to frequently drink small amounts of water or cool fluids. One cup (250 ml) every 15-20 minutes when working in hot conditions.
- **Allow time for acclimatization**
- **Provide rest breaks.** Rest breaks allow the body time to rid itself of excess heat, reduce the production of internal body heat, and provide greater blood circulation to the skin.
- **Allow workers to set their own work pace** when possible.
- **Schedule physically demanding jobs** for cooler periods of the day.
- **Carefully monitor** infrequent or irregular tasks such as emergency repairs or working near hot process equipment as these tasks often result in heat stress.
- **Provide appropriate training** and education to recognize and treat heat stress.

- **Pay attention to workers with special needs.** Workers should discuss limitations and precautions with their doctor.
- **Prepare safe work practices** specific to work in hot conditions.

14.4 Personal Protective Equipment

Adjust the clothing requirements, when possible. In hot and humid conditions light clothing allows maximum skin exposure and more efficient sweat evaporation. However, personal protective equipment must be selected based on hazard assessment of the task at hand and by following manufacturer’s guidelines for use in hot conditions.

Certain types of protective equipment such as hard hats, coveralls, or gloves may be necessary to protect workers from hazards. This kind of clothing or equipment may increase the heat stress burden experienced by an individual.

Working in certain hot environments may require specially designed heat-protective clothing, footwear, insulated gloves and suits, reflective clothing, infra-red reflecting face shields and eye protection that absorbs radiation when work involves very hot conditions like hot ovens and extremely hot elements like molten metals.

Specialized clothing such as heavy coveralls, fire retardant clothing for firefighters or chemical resistant clothing may be required. Impermeable clothing such as these, and heavy clothing which fails to “breathe” add heat burden because the body cannot cool off by air circulation and sweat evaporation processes.

For extremely hot conditions thermally conditioned clothing is available, such as:

- A self-contained air-conditioner in a backpack.
- A compressed air source that feeds cool air into the jacket or coveralls through a vortex tube.
- A jacket that has pockets that can be filled with ice-packs.

Clothing

Light clothing allows maximum exposure and efficient body cooling by sweat evaporation. Long sleeve shirts and pants prevent exposure to direct sunlight.

Cotton clothing is cooler than polyester, but cotton absorbs moisture and may stay moist. Damp clothing may become uncomfortable.

Long underwear moderates extreme changes in temperatures for workers who move back and forth between very hot, dry indoor environments and cold, winter outdoor environments.

Personal Measures

- Wear light clothing that allows sweat to evaporate if possible.
- Use sunscreen with minimum SPF 30 for working outside.
- Cover your head when working outside.
- Avoid eating large meals before working in hot environments.
- Avoid alcohol or beverages with caffeine. These make the body lose water and increase the risk of heat stress.
- Check with your doctor to see if your medication may affect your heat tolerance.
- Discuss the need for supplementary salt to alleviate dehydration in hot working conditions with your doctor.
- Keep an eye on your co-workers for symptoms of heat stress.

15 HEAT EXPOSURE GUIDELINES

There are two sources of heat exposure; the outside environment, and internal muscle activity. The heating and cooling balance of the body depends on workplace factors like:

- Air temperature
- Relative humidity in the air
- Workload
- Radiant heat sources
- Physical condition

High temperatures and high levels of physical work create heat stress. The body cools itself by evaporating sweat. High humidity prevents sweat from evaporating. Humidity is therefore one of the most critical factors in evaluating the impact of heat stress.

It is important to measure workplace temperature and humidity. There are several way to determining heat stress through measuring temperature and humidity:

Thermal Hygrometer

This digital device is easily acquired in hardware or office-supply stores and measure temperature and *relative* humidity. The reading may not be accurate if placed in contact with a hot surface or in direct sunlight.

Humidex Values

A scale developed to chart the combined effects of warm temperatures and humidity.

Wet-bulb Globe Temperature (WBGT) Index

A measurement taking into account air temperature, air movement, radiant heat and humidity.

“Sweat evaporation stops entirely when the relative humidity reaches about 90 percent. Under these circumstances, the body temperature rises and may cause illness.”

Source: Humidex Rating and Work, https://www.ccohs.ca/oshanswers/phys_agents/humidex.html, *OSH Answers*, Canadian Centre for Occupational Health and Safety (CCOHS), July 2, 2019. Reproduced with the permission of CCOHS, 2021.

Occupational Exposure Guidelines

Exposure limits provide useful guidelines to help control worker exposure to heat, but an exposure limit alone is not enough to assess the hazard. All aspects of the potential hazards and risks should be considered in a hazard assessment.

The body gets used to working in a hot environment over time through a process of acclimatization. Full acclimatization takes at least 7 to 14 working days when working in hot conditions, but the process can take up to three weeks. **A scheduled exposure is recommended.** (Also see: [Chapter 16 Break Schedule for Working in Heat](#) & [Chapter 17 Heat Stress Acclimatization Guide](#))

15.1 Humidex

The humidex is a measure of how hot people feel in the same way as a wind chill index shows how cold people feel. It combines temperature and humidity readings into a number value as a way of indicating how the body perceives temperature and moisture in the air.

Under certain workplace conditions, the humidex may serve as an indicator of discomfort resulting from occupational exposures to heat. The measurement of the temperature and relative humidity need to be taken in the workplace to be of use. If you know the temperature and relative humidity, the chart on the next page can be used to determine the humidex rating.

The humidex response plan developed by Occupational Health Clinics for Ontario Workers (OHCOW) on the next page is based on ACGIH Heat Stress TLVs, and translated into Humidex values. An action limit is set to prevent workers' body temperature from exceeding 38°C, or 38.5°C for acclimatized workers.

The guideline is divided into two sections for action limits called Humidex 1 and Humidex 2 and applies to workers in regular summer clothing.

Humidex 1, General Controls:

General controls apply to unacclimatized workers and include providing annual heat stress training, encouraging adequate fluid replacement, permitting self-limitation of exposure, encouraging watching out for symptoms in co-workers, and adjusting expectations for workers coming back to work after an absence.

Humidex 2, Job-Specific Controls:

Job-specific controls include engineering controls to reduce physical job demands, shielding of radiant heat, increased air movement, reduction of heat and moisture emissions at the source, adjusting exposure times to allow sufficient recovery, and personal protective equipment that provides for body cooling.

15.2 Humidex Based Heat Stress Response Chart

HUMIDEX 1 General Controls Moderate Physical work, Unacclimatized worker OR Heavy physical work, Acclimatized worker	RESPONSE	HUMIDEX 2 Job-specific Controls Moderate Physical work, Acclimatized worker OR Light physical work, Unacclimatized worker
25-29°C	<ul style="list-style-type: none"> Supply water to workers on “as needed” basis. 	32-35°C
30-33°C	<ul style="list-style-type: none"> Post Heat Stress Alert Notice. Encourage workers to drink extra water. Start recording hourly temperature and relative humidity. 	36-39°C
34-37°C	<ul style="list-style-type: none"> Post Heat Stress Warning Notice. Notify workers that they need to drink extra water. Ensure workers are trained to recognize heat stress symptoms. 	40-42°C
38-39°C	<ul style="list-style-type: none"> Provide 15 minutes relief per hour. Provide adequate cool (10-15°C) water. At least 1 cup (240ml) of water every 20 minutes. Workers with symptoms should seek medical attention. 	43-44°C
40-42°C	<ul style="list-style-type: none"> Work with 30 minutes relief per hour in addition to the provisions listed. 	45-46°C
43-44°C	<ul style="list-style-type: none"> If possible, work with 45 minutes relief per hour in addition to the provisions listed above. 	47-49°C
45°C or over	<ul style="list-style-type: none"> Only medically supervised work can continue. 	50°C and over

Source: Adapted from Occupational Health Clinic for Ontario Workers (OHCOW) (2017), [Humidex Based Heat Response Plan](#)

15.3 Humidex Based Heat Stress Values

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

Source: Adapted from Occupational Health Clinic for Ontario Workers (OHCOW) (2017), [Humidex Based Heat Response Plan](#)

Humidex 1 Unacclimatized	ACTION	Humidex 2 Acclimatized
45+	STOP WORK! Only medically supervised work continues	50+
43 - 44	Work with 45 minutes relief per hour	47 - 49
40 - 42	Work with 30 minutes relief per hour	45 - 46
38 - 39	Work with 15 minutes relief per hour	43 - 44
34 - 37	Heat Stress Warning Notice. Stay hydrated!	40 - 42
30 - 33	Heat Stress Alert Notice. Extra Water	36 - 39
25 - 29	Water as needed.	32 - 35

Source: Adapted from Occupational Health Clinic for Ontario Workers (OHCOW) (2017), [Humidex Based Heat Response Plan](#)

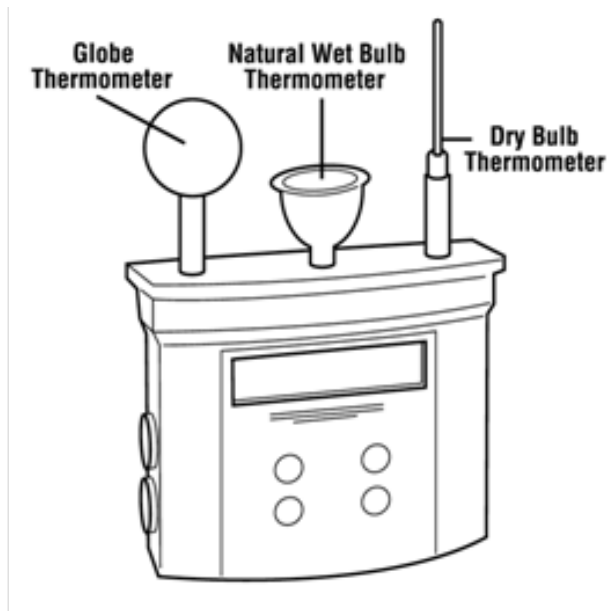
15.4 Wet-Bulb Globe Temperature (WBGT) Index

Occupational hygienists recommend using the Wet Bulb Globe Temperature (WBGT) index to measure workplace conditions where heat is a health and safety hazard. The ACGIH publications *TLVs and BEIs* provide screening criteria and guidelines for limiting heat stress and heat stress management use values based on the WBGT.

A normal thermometer is called a dry bulb thermometer. The wet bulb globe temperature is calculated using a formula that takes into account air temperature, speed of air movement, radiant heat from hot objects, sunshine and body cooling due to sweat evaporation.

It measures the cooling effect of evaporation caused by air movement and consists of a normal thermometer wrapped in a wick and kept moist. As air move through the wet wick water evaporates in a similar way sweat evaporates and cools the body.

There are direct-reading WBGT meters, also called heat stress indicators that are commercially available. Such devices require regular maintenance to produce accurate values. When using heat stress indicators follow ACGIH or manufacturer's guidelines.



For more information on WBGT see Canadian Centre for Occupational Health and Safety CCOHS (2018). [Hot Environments- Control Measures](#)

16 BREAK SCHEDULE FOR WORKING IN HEAT

SCREENING CRITERIA FOR HEAT STRESS EXPOSURE (WBGT VALUES IN °C)								
Allocation of Work in Work/Rest Cycle	Acclimatized				Unacclimatized			
	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
75-100%	31.0	28.0	--	--	28.0	25.0	--	--
50-75%	31.0	29.0	27.5	--	28.5	26.0	24.0	--
25-50%	32.0	30.0	29.0	28.0	29.5	27.0	25.5	24.5
0-25%	32.5	31.5	30.5	30.0	30.0	29.0	28.0	27.0

Note:
Criteria is not equivalent to regular thermometer readings, but in WBGT values in °C

- Assumes 8-hour workdays in a 5-day workweek with conventional breaks.
- TLVs assume that workers exposed to these conditions are adequately hydrated, are not taking medication, wear lightweight clothing, and are in generally good health.

Examples of workloads:

Rest - Sitting (quietly or with moderate arm movements.)

Light work - Sitting or standing to control machines; performing light hand or arm work (e.g. using a table saw); occasional walking, driving.

Moderate work – Walking about with moderate lifting and pushing and pulling; walking at moderate pace (e.g. scrubbing in a standing position).

Heavy work – Pick and shovel work, digging, carrying, pushing and pulling heavy loads, walking at fast pace (e.g. carpenter sawing by hand).

Very Heavy work- Very intense activity at fast to maximum pace (e.g. shoveling wet sand).

Adapted from: 2016 TLVs® and BEIs® - *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*. American Conference of Governmental Industrial Hygienists (ACGIH), 2016, p. 218

The ACGIH exposure limits were developed to protect workers from heat-related illnesses. They are higher than they would be if they were intended to prevent discomfort. When wearing heavier clothing the exposure limits should be lowered. Consult the ACGIH publications on TLVs and BEIs for more detailed information on screening criteria, categories of work demands and guidelines for limiting heat stress and heat stress management.

17 HEAT STRESS ACCLIMATIZATION GUIDE

Acclimatization is the process whereby people adapt to different temperatures. Workplace acclimatization is important because it allows you to work safely and efficiently. Through this process the body can gradually get used to working in a different climate. Employers should have a heat stress policy and implement acclimatization plans if heat stress is a risk factor.

Benefits of Heat Acclimatization

- Gradually increasing the intensity or duration of work done in heat improves heat tolerance for working in those conditions.
- Gradual exposure causes less strain to the heart and other vital organs.
- The body becomes better at sweating and cooling itself.
- The ability of workers to perform physical tasks in heat comfortably increases.

Acclimatization Tips

- Working to the point of heat exhaustion will not help with heat tolerance.
- Sudden shifts in work intensity and temperature increases the risk for heat illness.
- The body adapts to the level of work demanded from it.
 - Doing light work in heat will only acclimatize you to light work.
- Hydration is vital. Acclimatized workers need more water, not less.
- Eating regular meals helps with acclimatization.
 - Food replaces electrolytes lost in sweat, especially in the beginning.

Source: Adapted from National Institute for Occupational Safety and Health (NIOSH). (2017). *Heat Stress Acclimatization*.

Symptoms such as fatigue, dizziness, heat rash and stomach discomfort are common during the adjustment period. Dehydration can cancel the benefits of acclimatization.

Source: Adapted from Occupational Health Clinic for Ontario Workers (OHCOW) (2007). *Heat Stress Awareness Guide*

Acclimatization Schedule

The best approach is to increase the work done in a hot setting slowly over a period of 7 to 14 days.

- Typically acclimatization requires at least two hours of heat exposure per day or two 1-hour periods.
- Acclimatization can be maintained for a few days after heat exposure ends.
- After 1 week away from working in heat the benefits of acclimatization is lost.
- After 1 month away from working in heat, tolerance resets to baseline.

Acclimation Schedule for NEW Workers

- Starting new employees with work in hot conditions at full intensity is not a safe practice.
- Heat casualties happen most often with new or less experienced workers.
- Adjustment to a worker's acclimatization schedule will depend on the environment, the type of work and on individual factors.

Day Schedule	Percentage of Usual Work Duration
Day One	20% usual work duration
Day Two	40% usual work duration
Day Three	60% usual work duration
Day Four	80% usual work duration
Day Five	100% usual work duration

Acclimation Schedule for Workers with Experience*

Day Schedule	Percentage of Usual Work Duration
Day One	50% usual work duration
Day Two	60% usual work duration
Day Three	80% usual work duration
Day Four	100% usual work duration

*Experience with the Same Job or returning from an Absence

Instead of progressively increasing the exposure times on the job in a hot environment, you can acclimatize by gradually increasing the physical demands of the job over a week or two.

Source: Adapted from National Institute for Occupational Safety and Health (NIOSH). (2017). [Heat Stress Acclimatization](#)

18 CASE STUDIES

18.1 Cold Exposure Case Study

A carpenter and work crew is working outside on a -20°C day in February, on the 9th floor of a building under construction. The radio reports a general wind chill of -27.

Hazard Assessment

- On the ninth floor, the wind is blowing work orders around the space. Workers estimate the wind at between 20 and 25 km/h.
- The wind is blowing from a side that has support beams, but no walls.
- The carpenter is doing work that requires dexterity and needs to work without gloves. The work involves moderate physical activity.
- All members of the crew are experienced, and have been working at this location for at least 2 months.

Action

- The wind speed on the 9th floor may be more than the wind chill value reported on the radio, so workers decide to use a work warm-up schedule matching -26 to -28 wind chill at 20-25 km/h. This equates to a maximum of 55 minutes of work, with 3 breaks, in a 4-hour shift.
- Workers will take their breaks on the first floor, which is completely enclosed and heated, in an area currently used as meeting area. Since the meeting space is not available in the afternoon, later breaks will be taken in the crew vans.
- The carpenter will do as much measuring and layout as possible on the 8th floor, which has more walls that provide a better wind break than the structure on the 9th floor.
- The crew reviews the health effects and symptoms of cold exposure. Since many of them work in isolation, they agree to check in with an assigned buddy every 30 min.
- They confirm that everyone is dressed appropriately in three layers including an inner layer to wick away sweat, a middle layer to retain heat, and a third outer layer to protect from wind. Workers will remove the two outer layers when in the break room. Hats and extra socks are important. Workers are encouraged to wear their mittens or gloves whenever possible. A change of clothes is necessary if excess sweating occurs. Warm drinks, soup and extra water are provided in the break room.

18.2 Heat Exposure Case Study

It's late June and an asphalt paving crew is working 50 km from town on a clear sunny day. The temperature rises to 29°C. The radio reports a humidex value of 33.

The hazard assessment reveals a few more facts...

- A humidex of 33 is unusual and it is the first humidex value reported for the year.
- There are no buildings or shelters available in the immediate area.
- The crew is laying asphalt – the asphalt has radiant heat that will add to the overall heat felt by workers.
- There are new members on the team.

Action

- A work-rest schedule is put into effect. Since this is the first heat wave of the paving season, all crew members are considered new and unacclimatized. They opt for a conservative plan by working for 45 minutes with a 15-minute break each hour.
- In addition, every 15 minutes workers rotate between workstations – sharing the workload between shoveling the asphalt and driving.
- Extra water (3 cups per person, per hour) is brought to the site.
- Everyone reviews the health effects and symptoms of heat strain. Crew members are encouraged to "buddy-up" and watch each other for warning signs.
- One worker offers a camping dining tent, which is set up to provide shade for the water and rest area.
- Workers continually monitor each other for warning signs of heat strain.
- Workers also listen to the radio for updates. At the end of the day the radio announces that the heat and humidity will continue. The crew boss calls in extra workers so they can rotate job positions more often, and still keep the work on schedule.

18.3 Heat Stroke Case Study

A 23-year old man started to dig a ditch with other workers on an oil rig site at 3 pm, in August. He took one break for a drink of water. At 6 pm, he complained of dizziness and retired to a shaded area. After about 10 minutes, he came running out in a highly agitated state and began screaming obscenities at his co-workers. He was taken to an air-conditioned kitchen in the camp. His skin felt very hot and dry. Wet towels were used for cooling. He was transported by truck to the nearest hospital. Despite aggressive treatment at hospital, the worker died 33 days after the onset of heat stroke.

(From: Sherman, R. et al. *Occupational Death Due to Heat Stroke: Report of Two Cases*, 1989, Canadian Medical Association Journal, Vol. 140, pgs.1057-1058)

Hazard Assessment and Investigation

- Temperature and relative humidity varied greatly that day, with the maximums reaching 31°C and 87% respectively. There had been no wind.
- The worker collapsed on his first day at work after an 18-day layoff.
- There was no evidence of drug or alcohol consumption during the few days before his return to work.
- His fluid intake had been low on the day of the incident.

Action

- Ensure good hydration and fluid intake by all workers (at least 250 ml (1 cup) for every 15-20 minutes of work).
- Initiate a work-rest schedule for unacclimatized workers despite the fact that the temperature and humidity were likely below the levels at which a 75% work-25% rest regimen is recommended. The American Conference of Government Industrial Hygienists (ACGIH) recommendations assume that workers are acclimatized, fully clothed, and have adequate water and salt intake.
- Due to the lay-off, the worker was likely not physically accustomed to the work. A "return-to-work" type schedule should be implemented for physically demanding jobs.
- Train all workers about the signs and symptoms of heat stress.

The authors of this report indicated that heat stroke has a 50% death rate, even with aggressive medical treatment. Therefore, the best way to manage heat stroke is to control the factors that cause a person to over-heat.

19 COLD STRESS POLICY

Purpose and Application:

This policy is intended to protect workers from potential adverse effects of overexposure to cold. It applies to all _____ (company name) workers who work in low temperatures, wind and/or moisture for significant time periods.

Responsibilities:

Departments & Divisional Responsibilities:

- Identify jobs with a potential risk of cold stress.
- Develop and maintain written job-specific safe work procedures.
- Inform workers and their supervisors where their work involves potential risk of cold stress.
- Develop a process to ensure supervisors and workers are advised of:
 - Factors which can predispose them to cold stress.
 - The warning signs and symptoms of cold stress conditions (frostbite and hypothermia).
 - The measures to take to protect against this hazard (e.g. wearing appropriate clothing).
 - The job-specific safe work procedures.
- Post information on cold stress in the workplaces of workers potentially exposed to this hazard.
- If uniforms or clothing are being provided by the department, ensure that clothing specifications reduce the risk of cold stress (while providing appropriate protection from other hazards, where necessary).

Supervisor Responsibilities:

- Familiarize themselves with all jobs under their supervision which have been identified to have potential risk of cold stress and the associated safe work procedures.
- Ensure training/information sessions are provided to workers whose work places them at risk of cold stress.
- Monitor environmental conditions (i.e. temperature and wind velocity and/or wind chill), as appropriate, on cold days and on days where brisk wind and cold air temperature combine to reach levels considered hazardous.
- Implement safe work procedures established to prevent cold-stress related injuries.
- Advice to Workers:
 - Wear multiple layers of light, loose fitting clothing.

- Pay special attention to protecting feet, hands, face & head.
- Report to their supervisor cold stress-related symptoms in themselves or their co-workers
- Adhere to the recommended work-warm-up schedule, established to prevent frostbite or hypothermia.
- Reinforce personal protection strategies to workers verbally, on a continual basis.

Workers' Responsibilities:

- Be familiar with cold stress hazards, predisposing factors and preventative measures.
- Follow safe work procedures established to prevent cold-stress related injuries.
- Report to their supervisor cold stress-related symptoms in themselves or their co-workers.
- Follow recommended schedule of rest breaks, as advised by supervisors, to prevent frostbite or hypothermia.
- Understand and be able to recognize frostbite and hypothermia.

Responsibilities of Occupational health and safety staff, in conjunction with supervisory staff and the Joint Work Site Health and Safety Committee:

- Provide assistance in the development of safe work procedures.
- Provide assistance in the provision of information sessions.
- Prepare information related to cold stress.
- Address cold stress concerns of workers.
- Make recommendations during the development of or on the improvement of existing safe work procedures, as needed.

Source: Work Safe Alberta (2014), pgs. 80-81, [Best Practice - Working Safely in Heat and Cold](#)

20 HEAT STRESS POLICY

Purpose and Application

This policy is intended to protect workers from potential adverse effects of overexposure to heat. It applies to all _____ (company name) workers who work in high temperature conditions for significant time periods.

Responsibilities

Department & Divisional Responsibilities:

- Identify jobs with a potential risk of heat stress and develop job-specific safe work practices which address this hazard.
- Inform workers and their supervisors where their work involves potential risk of heat stress.
- develop a process to ensure supervisors and workers are advised of:
 - Factors which can predispose them to heat stress.
 - The warning signs and symptoms of heat stress conditions (heat rash, heat cramps, heat exhaustion and heat stroke).
 - The measures to be taken to protect against this hazard (e.g. having water available to drink during work shift, wearing appropriate clothing and pacing oneself while working).
- Post information on heat stress in the workplaces of workers potentially exposed to this hazard.
- Ensure workers have access to a drinking water source for filling personal containers at the beginning of the shift, if water is not accessible throughout the shift.
- If uniforms or clothing are being provided by the department, ensure that clothing specifications reduce the risk of heat stress (while providing appropriate protection from other hazards, where necessary).
- Allow a gradual period of acclimatization to work in hot environments for new and other non-acclimatized workers [Note: Even workers who work outside on an ongoing basis may not be acclimatized if temperatures rise steeply within a short time period early in the spring or summer.]
- Re-schedule work on hot days to cooler times of the day, when feasible.
- Where feasible and necessary, reduce temperature and humidity through air cooling and conditioning of enclosed work environments or shading of open areas.

Supervisor Responsibilities:

- Schedule information sessions for workers whose work places them at risk of heat stress.

- On days where environmental conditions have reached designated threshold levels according to the attached guideline.
- Implement safe work procedures established to prevent heat-induced illness.
- Determine any additional rest breaks that may be required as a result of workload and local conditions.
- Advise Workers to:
 - Drink enough fluids to replace those lost through sweating and breathing.
 - Take breaks in the shade or a cool area, as needed to avoid heat exhaustion or collapse.
 - Report to their supervisor heat stress-related symptoms in themselves or their co-workers.
 - Adhere to the recommended rest break schedule, established to avoid heat exhaustion or collapse.

Worker Responsibilities:

- Familiarize themselves with heat stress hazards, predisposing factors and preventative measures.
- Follow safe work practices established to prevent heat related illness.
- Drink enough fluids to replace those lost through sweating and breathing.
- Report to their supervisor heat stress-related symptoms in themselves or their co-workers.
- Follow recommended schedule of rest breaks, as advised by supervisors, to avoid heat exhaustion or collapse.

Responsibilities of the Occupational health and safety staff, in conjunction with supervisory staff and the Joint Work Site Health and Safety Committee:

- Provide assistance in the development of safe work procedures.
- Provide assistance in the provision of information sessions.
- Prepare information related to heat stress.
- Address heat stress concerns of workers.
- Make recommendations during the development of or on the improvement of existing safe work procedures, as needed.

Source: Work Safe Alberta (2014), pgs.78-80, [Best Practice - Working Safely in Heat and Cold](#)

DEFINITIONS & ABBREVIATIONS

DEFINITIONS

Acclimatization

Process of adapting to a new temperature.

Chilblains

A mild cold injury caused by prolonged and repeated exposure for several hours to air temperatures ranging from the freezing point at 0°C to as high as 16°C.

Core Temperature

An internal core temperature of 37°C is necessary for vital organs to function normally. During a regular day, body temperature may vary by about 1°C.

Dehydration

Loss or deficiency of water in the body. Dehydration can occur as a result sweating, vomiting or diarrhea. In hot environments excessive sweating can cause dehydration and in cold climates, perspiration.

Emergency Work

Critical work essential to preservation of life.

Frostnip

Occurs when ear lobes, noses, cheeks, fingers, or toes are exposed to the cold and the top layers of the skin freeze. The skin of the affected area turns white and may feel numb.

Frostbite

Frostbite happens when fluids around the body's tissues freeze at below 0°C. The damage to blood vessels may be severe and permanent, and blood circulation may stop in the affected tissue.

Hazard

Any situation, thing or condition that may expose a person to risk of injury or occupational disease.

Immersion Foot

Also known as *trench foot*, this result from prolonged exposure in a damp or wet environment in temperatures ranging from the freezing point to about 10°C. Primary injury is to nerve and muscle tissue. Symptoms include tingling, numbness, itching, pain, swelling, leg cramps, blisters or bleeding under the skin.

Heat Cramps

Painful muscle spasms that occur during strenuous activity in hot environments. Associated with cramping in the abdomen, arms and calves, the muscle pains may occur alone or in combination with another heat stress disorder. Inadequate consumption of fluids or electrolytes often contributes to heat cramps.

Heat Edema (Swelling)

Swollen hands or feet and ankles when people sit or stand for a long time in a hot environment. Heat causes the blood vessels to expand (dilate) and body fluid moves into the hands or legs.

Heat Exhaustion

A break down in the body's cooling system resulting from fluid loss and inadequate water intake. Symptoms include cool moist skin, a body temperature above 38°C, weak pulse, heavy sweating, panting, weakness, dizziness, nausea, vomiting, and blurred vision.

Heat Rash (Prickly Heat or Millaria)

An itchy rash of small raised red spots on the face, neck, back, chest and thighs caused by a hot and moist environment.

Heat Strain

The body's responses to excessive heat exposure.

Heat Stroke

Acute illness caused by overexposure to heat. Symptoms include dry, hot skin, high body temperature and mental dysfunction. Heat stroke can be fatal in the absence of immediate medical attention.

Heat Syncope

Temporary loss of consciousness due to insufficient blood flow to the brain. Recovery is normally prompt and without long-term ill effects.

Humidex

A scale intended to express the combined effects of warm temperatures and humidity.

Humidity (Relative Humidity)

The measure of water vapour content in the air. Usually, relative humidity is expressed as a percentage of total possible moisture content.

Hyperthermia

Elevated body temperature. Extreme temperature elevation can become a medical emergency requiring immediate treatment to prevent disability and death.

Hypothermia

The body is unable to compensate for its heat loss under cold conditions and the body's core temperature starts to fall.

Metabolic Rate

Rate of energy (heat) production of the body. Metabolic heat production increases as the level of activity increases.

Occupational Exposure Limits (OELs)

Restrictions on the amount and length of time a worker is exposed to airborne concentrations of hazardous biological or chemical agents.

Personal Protective Equipment (PPE)

Any clothing, device or other article worn or used by a worker to prevent injury or to facilitate rescue.

Radiant Heat

Heat that comes directly from a hot object. When we stand near a furnace or in bright sunlight, we feel warm even when the surrounding air is cold.

Snow Blindness

A temporary loss of vision caused by exposure to bright sunlight reflected from snow or ice.

Thermal Comfort

A person's feeling of comfort, as in not too hot or not too cold. Variability between people with different metabolic rates, fitness levels, medical conditions, medication usage, ability to acclimatize, level of hydration and age affect how people perceive their comfort levels.

Wet-bulb Globe Temperature (WBGT) Index

A measurement taking into account air temperature, air movement, radiant heat and humidity.

Wind Chill

A mathematical calculation of how the air temperature feels on exposed skin due to wind.

Wind Chill Index

A measurement of the heat loss rate caused by exposure to wind.

ABBREVIATIONS**ACGIH**

American Conference of Governmental Industrial Hygienists. ACGIH is a professional society of government workers and educators who work to promote occupational safety and health. The organization publishes recommendations on ventilation, air sampling and airborne chemical concentration guideline called threshold limit values or TLVs, designed to limit and control exposure of workers to airborne chemicals in the workplace.

CCOHS

Canadian Centre for Occupational Health and Safety. Canada's national organization for promotion of workplace health and safety by providing information, advice, training and research.

CSA

Canadian Standards Association. A not-for-profit association serving business, industry and government in Canada. The organization develops standards that address needs such as enhancing safety and health.

OELs

Occupational Exposure Limits restrict the amount and length of time a worker is exposed to airborne concentrations of hazardous biological or chemical agents.

TLVs

Threshold Limit Values recommended by ACGIH and often used as guidelines to set occupational exposure limits.

UV

Ultraviolet radiation.

WBGT

Wet Bulb Globe Temperature Index. A measure of occupational heat exposure.

REGULATORY REQUIREMENTS

The Occupational Health and Safety Regulations address employer responsibilities concerning thermal conditions and worker health and safety.

Occupational Health and Safety Regulations Northwest Territories and Nunavut

PART 6

GENERAL HEALTH REQUIREMENTS

Thermal Conditions

- 74.** (1) Subject to subsection (3), at an indoor work site, an employer shall provide and maintain thermal conditions, including air temperature, radiant temperature, humidity and air movement, that
- (a) are appropriate to the nature of the work performed;
 - (b) provide effective protection for the health and safety of workers; and
 - (c) provide reasonable thermal comfort for workers.
- (2) If the thermal environment at an indoor work site is likely to be a health or safety concern to workers, an employer shall provide and maintain an appropriate and suitably located instrument for measuring the thermal conditions.
- (3) If it is not reasonably possible to control thermal conditions or if work is being performed outdoors, an employer shall provide and maintain measures for
- (a) the effective protection of the health and safety of workers; and
 - (b) the reasonable thermal comfort of workers.
- (4) If a worker is required or permitted to work in thermal conditions that are different from those associated with the worker's normal duties, an employer shall provide and require the worker to use suitable clothing or other personal protective equipment necessary to protect the health and safety of the worker.

PART 7

PERSONAL PROTECTIVE EQUIPMENT

Suitable and Adequate Equipment

- 89.** (1) If it is not reasonably possible to protect the health and safety of a worker by design of a plant and work processes, suitable work practices or administrative controls, an employer shall ensure that the worker wears or uses suitable and adequate personal protective equipment.
- (2) If personal protective equipment will not effectively protect a worker, an employer shall, if reasonably possible, provide alternative work arrangements for the worker.

PERSONAL PROTECTIVE EQUIPMENT

- 90.** (1) An employer who is required by these regulations to provide personal protective equipment to a worker shall
- (a) provide approved personal protective equipment for use by the worker at no cost to the worker;
 - (b) ensure that the personal protective equipment is used by the worker;
 - (c) ensure that the personal protective equipment is at the work site before work begins;
 - (d) ensure that the personal protective equipment is stored in a clean, secure location that is readily accessible to the worker;
 - (e) ensure that the worker is
 - (i) aware of the location of the personal protective equipment, and
 - (ii) trained in its use;
 - (f) inform the worker of the reasons why the personal protective equipment is required to be used and of the limitations of its protection; and
 - (g) ensure that personal protective equipment provided to the worker is
 - (i) suitable and adequate and a proper fit for the worker,
 - (ii) maintained and kept in a sanitary condition, and
 - (iii) removed from use or service when damaged.
- (2) If an employer requires a worker to clean and maintain personal protective equipment, the employer shall ensure that the worker has adequate time to do so during normal working hours without loss of pay or benefits.
- (3) If reasonably possible, an employer shall make appropriate adjustments to the work procedures and the rate of work to eliminate or reduce any danger or discomfort to the worker that could arise from the worker's use of personal protective equipment.
- (4) A worker who is provided with personal protective equipment by an employer shall
- (a) use the personal protective equipment; and
 - (b) take reasonable steps to prevent damage to the personal protective equipment.
- (5) If personal protective equipment provided to a worker becomes defective or otherwise fails to provide the protection it is intended for, the worker shall
- (a) return the personal protective equipment to the employer; and
 - (b) inform the employer of the defect or other reason why the personal protective equipment does not provide the protection that it was intended to provide.
- (6) An employer shall immediately repair or replace any personal protective equipment returned to the employer under paragraph (5)(a).

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APPENDIX – WEATHER DATA



Source: Environment and Natural Resources Canada

NORTHWEST TERRITORIES WEATHER DATA

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To find data for other locations, use the customize search option of the Canadian Climate Data On-Line service from Environment and Natural Resources Canada, available at:
https://climate.weather.gc.ca/climate_normals/index_e.html

NORTHWEST TERRITORIES

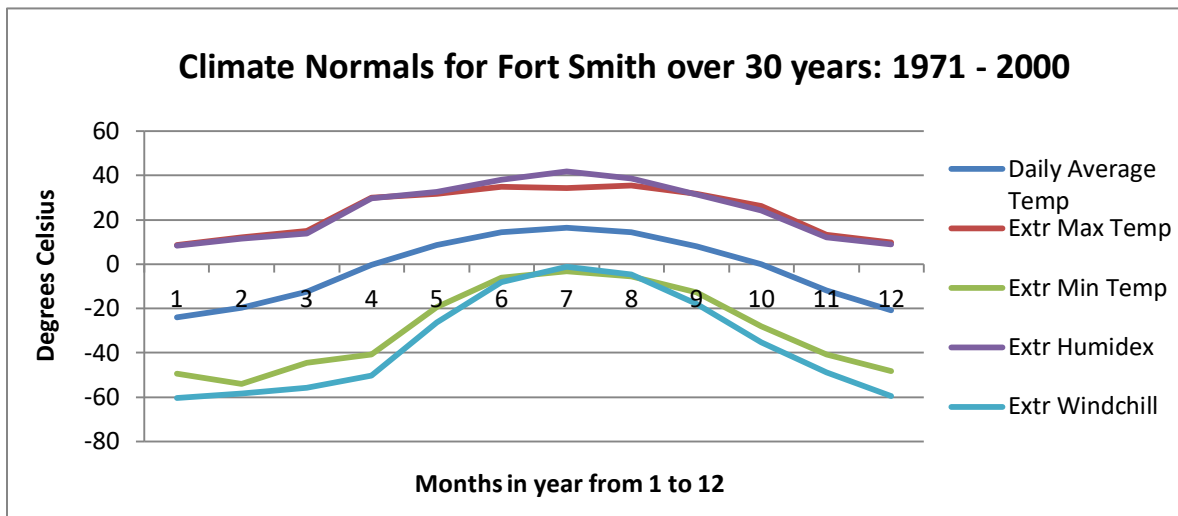


Source: Environment and Natural Resources Canada

Fort Smith

Latitude: 60°01'34.000" N Longitude: 111°55'46.000" W Elevation: 203.00 m

Month	2007			Climate Normals (30 Years: 1971 - 2000)				
	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Extreme Humidex	Extreme Wind Chill
Jan	-18.5	0.4	-37.9	-24.9	8.7	-49.4	8.4	-60.4
Feb	-22.2	-8.2	-37.3	-19.8	12.2	-53.9	11.6	-58.4
Mar	-14.4	10.2	-37.2	-12.4	14.9	-44.4	13.9	-55.7
Apr	0.9	16.6	-20.6	-0.4	30.0	-40.6	29.6	-50.4
May	9.0	29.8	-3.7	8.5	31.8	-19.4	32.7	-26.2
Jun	14.0	27.8	-2.9	14.3	35.0	-6.1	37.9	-8
Jul	19.0	31.0	5.1	16.5	34.4	-3.3	41.7	-1.2
Aug	12.1	25.5	-1.6	14.5	35.3	-5.6	38.5	-4.7
Sept	5.8	20.8	-3.4	8.0	31.7	-12.8	31.3	-17.8
Oct	2.6	15.7	-8.1	0.0	26.1	-27.9	24.1	-35.3
Nov	-10.5	3.0	-32.5	-11.8	13.3	-40.6	12.2	-48.8
Dec	-20.0	-6.4	-35.2	-20.9	9.7	-48.3	8.9	-59.6

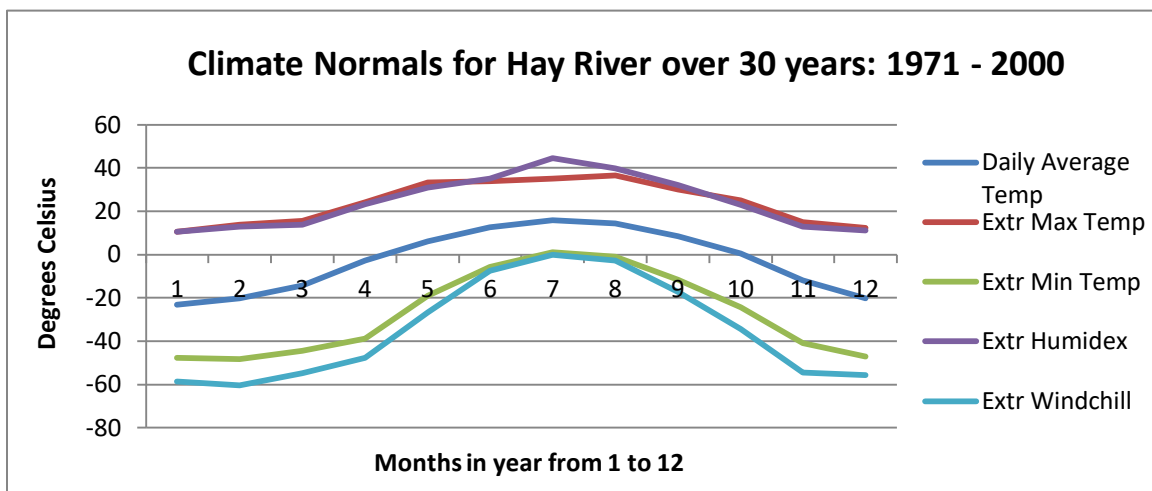


Hay River

Latitude: 60°50'20.000" N Longitude: 115°46'36.000" W Elevation: 164.00 m

Month	2007			Climate Normals (30 Years: 1971 - 2000)				
	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Extreme Humidex	Extreme Wind Chill
Jan	-17.8	1.9	-36.9	-23.1	10.7	-47.8	10.6	-58.7
Feb	-23.6	-7.5	-37.1	-20.2	13.9	-48.3	12.9	-60.4
Mar	-17.4	7.2	-36.7	-14.4	15.6	-44.4	13.9	-54.9
Apr	-0.8	18.1	-27.8	-2.7	24.1	-38.9	23.3	-47.7
May	6	25.6	-5.2	6.1	33.3	-18.9	31.1	-26.6
Jun	12.6	26.6S	0.8	12.6	34	-5.6	35.1	-7.4
Jul	17.7	29.3S	6.4	15.9	35	1	44.6	-0.1
Aug	11.8	25.5	-0.8	14.5	36.7	-1.1	39.8	-2.7
Sept	5.7	18.9	-2.6	8.5	30	-11.7	32.2	-17.1
Oct				0.4	25	-24.3	23	-34.3
Nov	-10.4	2.7	-28.5	-11.9	15	-40.8	12.8	-54.4
Dec				-20.3	12.2	-47.2	11.2	-55.8

S = More than one occurrence

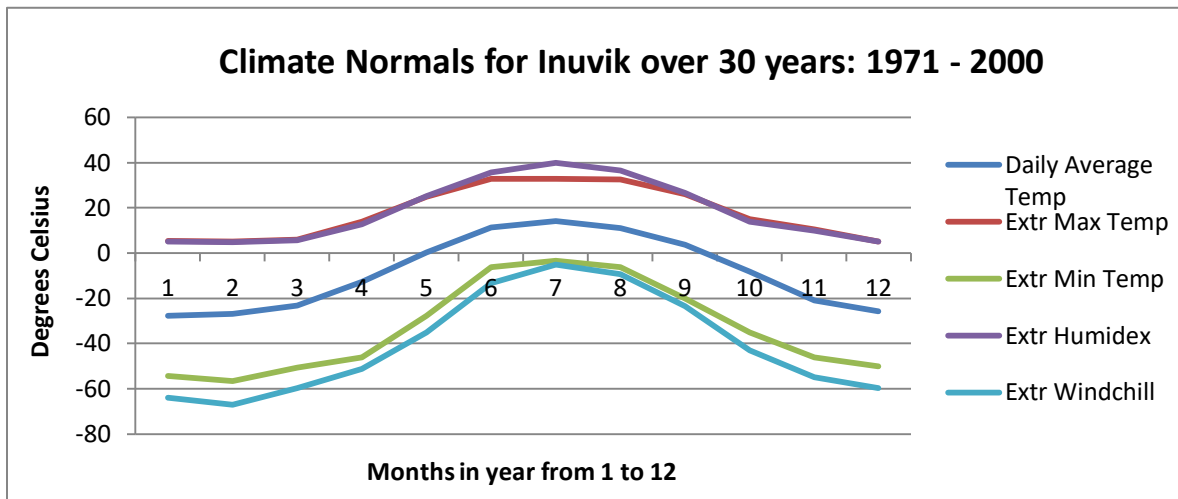


Inuvik

Latitude: 68°19'00.000" N Longitude: 133°31'00.000" W Elevation: 103.00 m

Month	2007			Climate Normals (30 Years: 1971 - 2000)				
	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Extreme Humidex	Extreme Wind Chill
Jan	-23.1	-6.9	-38.2	-27.6	5.4	-54.4	5.2	-64.1
Feb	-27.5	-13.9	-39.8	-26.9	5.2	-56.7	4.9	-67
Mar	-26.5	-6.7	-40.3	-23.2	6.1	-50.6	5.6	-59.6
Apr	-8.8	4.4	-19.8	-12.8	13.8	-46.1	12.8	-51.1
May	-2.6	15.5	-17.6	0.2	25	-27.8	25.2	-35.2
Jun	12.2	25.7	-0.7	11.3	32.8	-6.1	35.8	-13.3
Jul	15.5	27.9	1.4	14.2	32.8	-3.3	40	-5.2
Aug	11.1	23	2.3	11	32.5	-6.1	36.6	-9.2
Sept	4.0E	16.1E	-5.6	3.7	26.2	-20.1	26.7	-23.4
Oct				-8.2	15	-35	13.9	-43.1
Nov	-16.1	-5.9	-26.9	-21	10.6	-46.1	10	-55
Dec				-25.7	5	-50	5	-59.6

E = Estimated



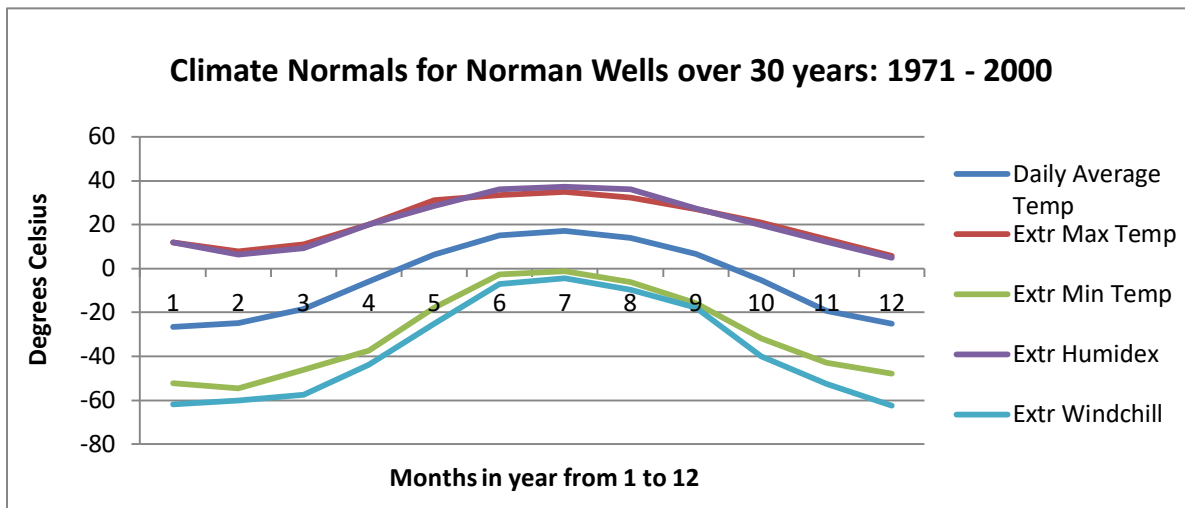
Norman Wells

Latitude: 65°17'15.090" N Longitude: 126°45'12.084" W Elevation: 93.60 m

Month	2007			Climate Normals (30 Years: 1971 - 2000)				
	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Extreme Humidex	Extreme Wind Chill
Jan	-23.8	-2.7	-39.3	-26.5	11.8	-52.2	11.8	-61.7
Feb	-28.8	-11.5	-45.3	-24.7	7.9	-54.4	6.3	-60.2
Mar	-25.4	-3.6S	-44.3	-18.4	11.1	-46.1	9.4	-57.5
Apr	-3.1	12.8	-24.1	-5.8	20	-37.2	20	-43.8
May	5	25.4	-9.3	6.5	31.1	-17.8	28.5	-25.1
Jun	14.9	29.6	-0.7	15	33.5	-2.8	36.2	-6.9
Jul	17.1	30.6	3	17	35	-1.1	37.2	-4.5
Aug	12.2	26.5	-2.9	13.8	32.4	-6.1	36	-9.6
Sept	5.4E	20.1E	-5.4E	6.6	27.1	-15.7	27.2	-17.7
Oct				-5.3	20.8	-31.7	19.8	-39.9
Nov	-17	-4.1S	-38.5	-19.3	13.3	-42.8	12.2	-52.4
Dec				-25.1	5.7	-47.8	4.8	-62.4

E = Estimated

S = More than one occurrence



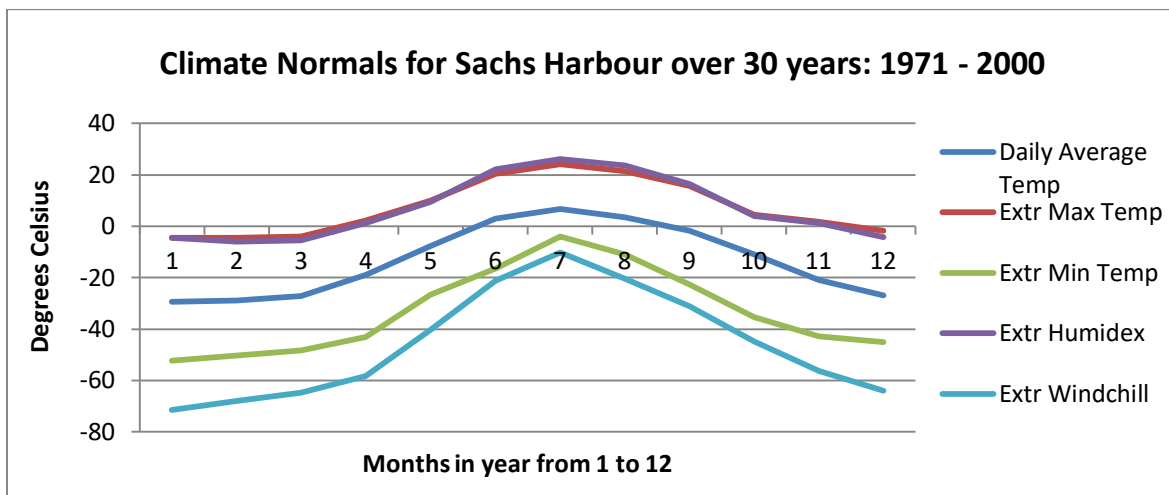
Sachs Harbour

Latitude: 71°59'33.000" N Longitude: 125°15'15.000" W Elevation: 87.50 m

Month	2007			Climate Normals (30 Years: 1971 - 2000)				
	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Extreme Humidex	Extreme Wind Chill
Jan	-25.2	-14.7	-37.7	-29.3	-4.4	-52.2	-4.4	-71.6
Feb	-28.0E	-14	-37	-29	-4.5	-50.2	-6.1	-68.1
Mar	-29.4	-16.2	-41.8	-27.2	-4	-48.4	-5.6	-64.8
Apr	-15.4	-5	-28.3	-18.9	2.2	-43	1.1	-58.4
May	-8.5	3.3	-18.7	-7.7	10	-26.7	9.4	-40.3
Jun	3.3	17.4	-3.6	2.9	20.5	-16.5	22.1	-21.1
Jul	11	23	-0.3	6.8	24.2	-4	26	-10.3
Aug	5.2	13.3	-1.2	3.5	21.5	-11	23.7	-20.4
Sept	-1.2	6.2	-8.4	-1.7	15.6	-22.8	16.3	-31.2
Oct				-11.1	4.4	-35.5	3.9	-44.9
Nov	-21.5E	-12.7	-29.9B	-20.9	1.7	-42.8	1.1	-56.4
Dec				-26.9	-1.7	-45	-4.3	-64.1

E = Estimated

B = More than one occurrence and estimated

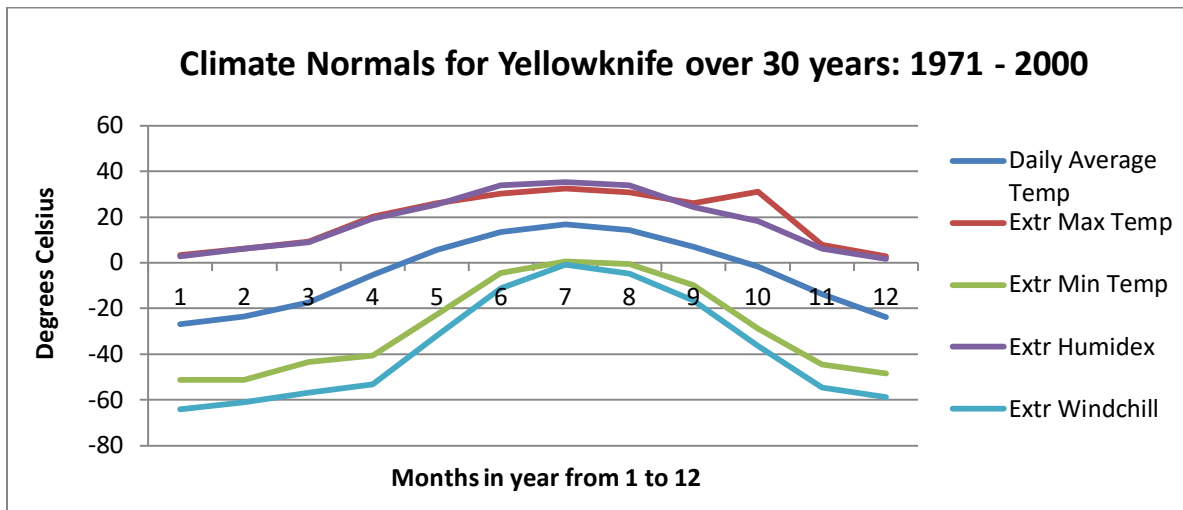


YELLOWKNIFE

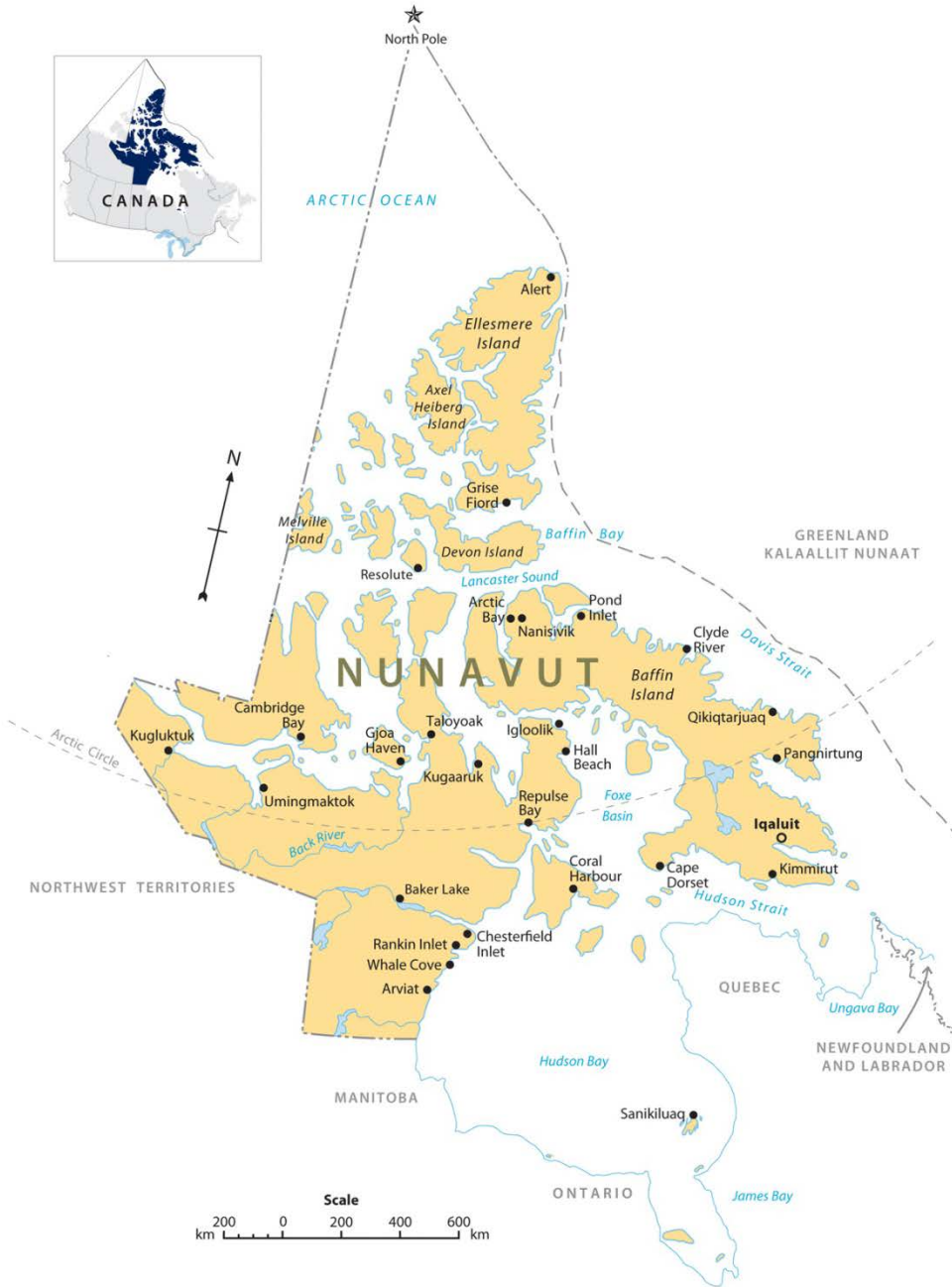
Latitude: 62°27'46.000" N Longitude: 114°26'25.000" W Elevation: 205.70 m

Month	2007			Climate Normals (30 Years: 1971 - 2000)				
	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Extreme Humidex	Extreme Wind Chill
Jan	-21.4	-7.2	-40.3	-26.8	3.4	-51.2	2.9	-64
Feb	-25.1E	-13.1	-38.7	-23.4	6.2	-51.2	6.1	-61
Mar	-20.1	0.8	-42	-17.3	9.3	-43.3	8.9	-56.8
Apr	-3	12.4	-25.5	-5.3	20.3	-40.6	19.4	-53.2
May	5.6	23.3	-6.9	5.6	26.1	-22.8	25.6	-31.8
Jun	13.5	27.7	1.2	13.5	30.3	-4.4	34	-11.2
Jul	18.7	28.4	11.1	16.8	32.5	0.6	35.4	-0.9
Aug	12.2	22.5	3	14.2	30.9	-0.6	34	-4.8
Sept	4.9	17	-2.9	7.1	26.1	-9.7	24.4	-16.4
Oct				-1.7	31	-28.9	18.1	-36.3
Nov	-12.3	0	-34.9	-13.8	7.8	-44.4	6.1	-54.7
Dec				-23.7	2.8	-48.3	1.6	-58.9

E = Estimated



NUNAVUT



Source: Environment and Natural Resources Canada

Alert

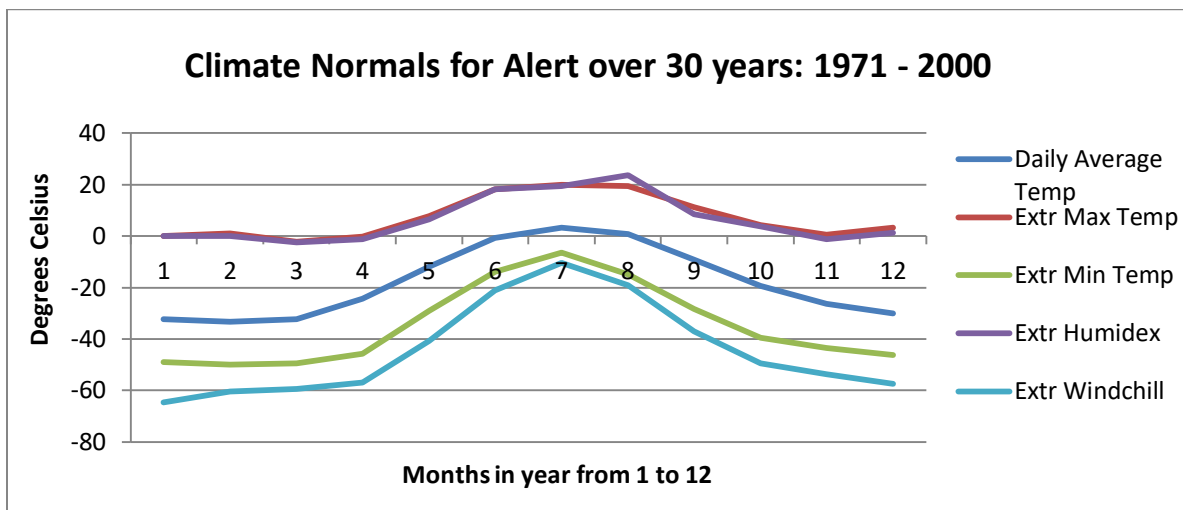
Latitude: 82°31'04.000" N Longitude: 62°16'50.000" W Elevation: 30.50 m

Month	2007			Climate Normals (30 Years: 1971 - 2000)				
	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Extreme Humidex	Extreme Wind Chill
Jan	-29.0E	-15.9	-38.7	-32.4	0	-48.9	0	-64.7
Feb	-28.1E	-12.7	-38.2	-33.4	1.1	-50	0	-60.5
Mar	-31.9	-18.2S	-42.7	-32.4	-2.2	-49.4	-2.4	-59.5
Apr	-19.4	-9	-34.4	-24.4	-0.2	-45.6	-1.1	-56.8
May	-13.2	-3.3	-21.6	-11.8	7.8	-29	6.6	-40.8
Jun	-0.4*	8.5*	-8.3*	-0.8	18.2	-13.9	18.1	-21.1
Jul	2.4	16.8	-2.6	3.3	20	-6.3	19.4	-10.3
Aug	1.6	11.6	-6.1	0.8	19.5	-15	23.8	-19.2
Sept	-6	2.8	-14.2	-9.2	11.2	-28.2	8.4	-36.9
Oct				-19.4	4.4	-39.4	3.9	-49.4
Nov	-23.9	-12.6	-32.5	-26.4	0.6	-43.5	-1.1	-53.7
Dec				-30.1	3.2	-46.1	1.4	-57.3

* The value displayed is based on incomplete data

E = Estimated

S = More than one occurrence

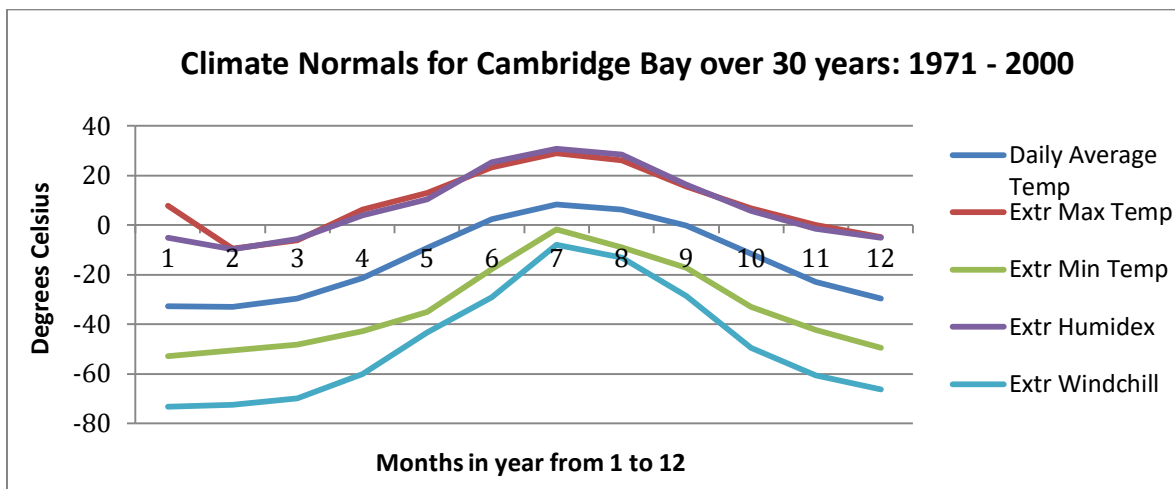


Cambridge Bay

Latitude: 69°06'29.000" N Longitude: 105°08'18.000" W Elevation: 31.10 m

Month	2007			Climate Normals (30 Years: 1971 - 2000)				
	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Extreme Humidex	Extreme Wind Chill
Jan	-30.4	-17.5	-43.2	-32.8	7.8	-52.8	-5	-73.4
Feb	-31.3	-18.9	-41	-33	-9.4	-50.6	-9.7	-72.6
Mar	-31.7	-14.9	-44.1S	-29.7	-6.1	-48.3	-5.6	-69.8
Apr	-18.4	-1.5	-33.2	-21.4	6.2	-42.8	3.9	-60.1
May	-12.4	-0.1	-26.8	-9.2	13	-35	10.5	-43.2
Jun	3.4	22.9	-10.7	2.4	23.3	-17.8	25.3	-29.2
Jul	11.9	24.4	3.6	8.4	28.9	-1.7	30.8	-7.9
Aug	5.9	14.6	0	6.4	26.1	-8.9	28.6	-13.1
Sept	-1.3	9.1	-9.3	-0.3	15.6	-17.2	16.3	-28.6
Oct	-9	0.5	-23.1	-11.5	6.9	-33	5.8	-49.4
Nov	-26.6	-12.8	-34.4	-23	0	-42.2	-1.4	-60.7
Dec	-28.4	-13.4S	-37.5	-29.6	-4.8	-49.4	-5	-66.3

S = More than one occurrence

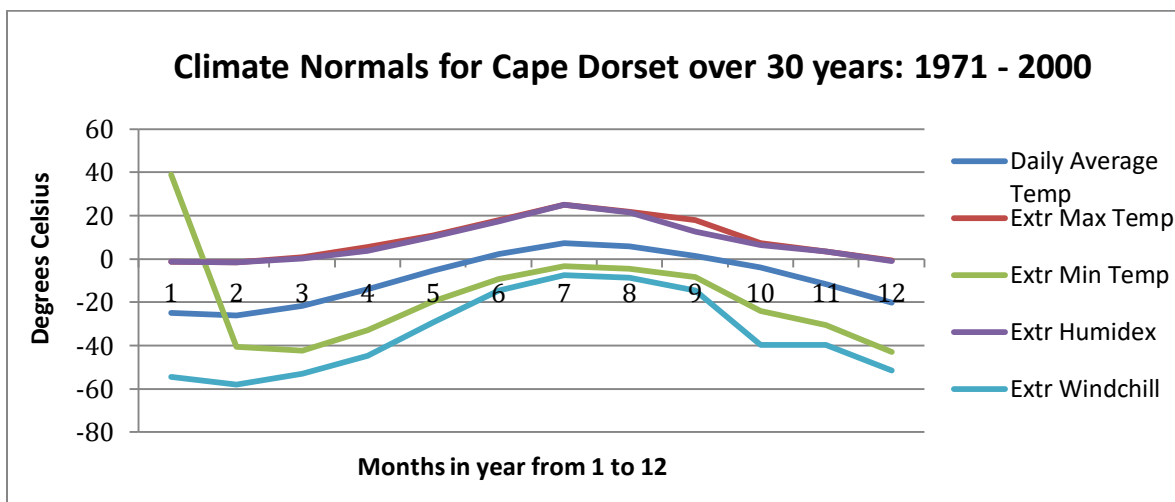


Cape Dorset

Latitude: 64°13'49.000" N Longitude: 76°31'30.000" W Elevation: 48.20 m

Month	2007			Climate Normals (30 Years: 1971 - 2000)				
	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Extreme Humidex	Extreme Wind Chill
Jan	-23.0*	-6.8*	-31.1*	-25	-1.4	-38.9	-1.4	-54.5
Feb	-18.2*	-9.4*	-25.1*	-26	-1.5	-40.6	-1.6	-58.1
Mar	-22.5	-3.6	-35.3	-21.6	0.8	-42.2	0.3	-53
Apr	-12	-1.1	-27.7	-14.1	5.6	-32.8	3.9	-44.6
May	-7.3	0.4	-13.6	-5.5	10.9	-19.6	10.4	-29.3
Jun	2	16.5	-4.9	2.3	17.9	-9.3	17.3	-14.6
Jul	7.7	18.2	0.7	7.4	25	-3.4	25	-7.6
Aug	7.4	15.9	1.9	5.7	21.9	-4.6	21.6	-8.7
Sept	1.4	10.8	-4.5	1.5	18.1	-8.3	12.7	-14.7
Oct				-3.9	7.2	-23.9	6.5	-39.7
Nov	-11.5*	-3.5*	-19.6*	-11.7	3.4	-30.6	3.4	-39.7
Dec				-20.2	-0.8	-42.8	-1.1	-51.4

* The value displayed is based on incomplete data



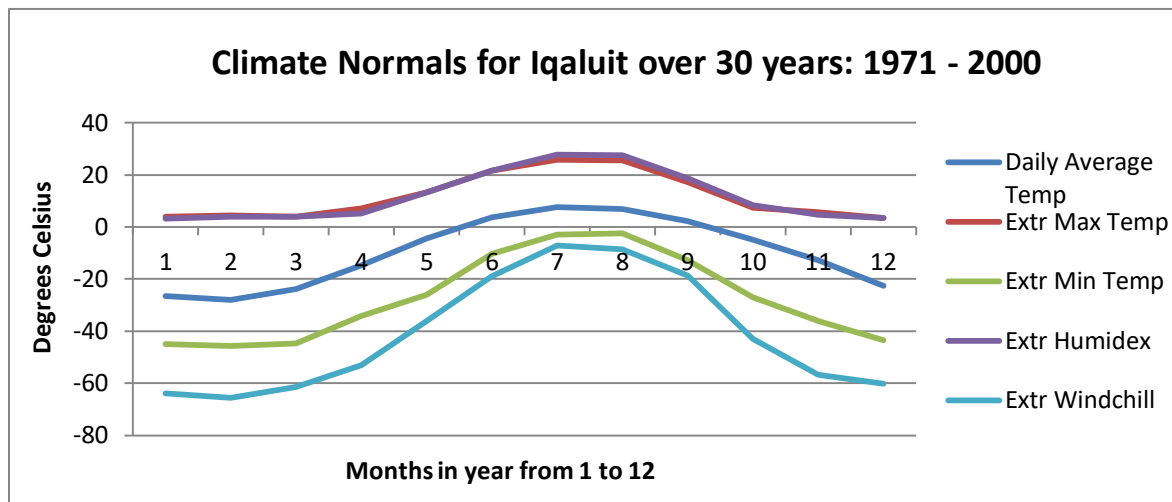
Iqaluit

Latitude: 63°45'00.000" N Longitude: 68°33'00.000" W Elevation: 33.50 m

Month	2007			Climate Normals (30 Years: 1971 - 2000)				
	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Extreme Humidex	Extreme Wind Chill
Jan			-34.5	-26.6	3.9	-45	3.3	-64
Feb	-21.1*	-12.9*	-35.1	-28	4.4	-45.6	3.9	-65.6
Mar	-22.9	-2.4	-36.3	-23.7	3.9	-44.7	3.9	-61.5
Apr	-14	0.2	-31.5	-14.8	7.2	-34.2	5.1	-53.1
May	-5.9	4.9	-16.9	-4.4	13.3	-26.1	13.3	-36
Jun	3.1	11.5	-6.7	3.6	21.7	-10.2	21.7	-18.8
Jul	6.6	19.9	2.1S	7.7	25.8	-2.8	27.8	-7.2
Aug	8.2	17.4	2.6	6.8	25.5	-2.5	27.6	-8.6
Sept	2.3	13.1	-5.9S	2.2	17.2	-12.8	18.8	-18.6
Oct				-4.9	7.3	-27.1	8.3	-42.9
Nov	-11.2	-0.5	-26.9	-12.8	5.6	-36.2	4.8	-56.8
Dec				-22.7	3.4	-43.4	3.4	-60.1

* The value displayed is based on incomplete data

S = More than one occurrence

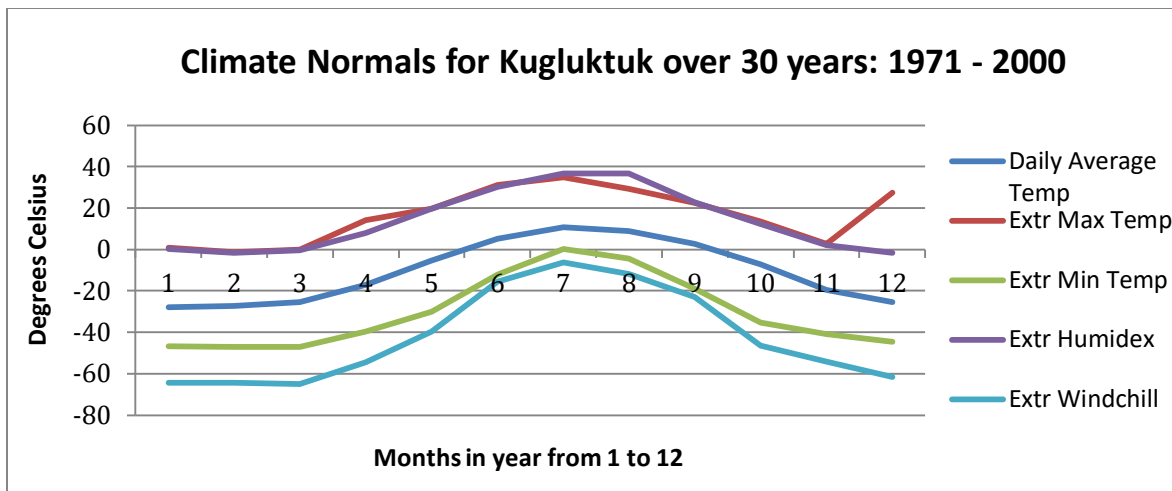


Kugluktuk

Latitude: 67°49'00.000" N Longitude: 115°08'38.000" W Elevation: 22.60 m

Month	2007			Climate Normals (30 Years: 1971 - 2000)				
	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Extreme Humidex	Extreme Wind Chill
Jan	-24.5	-13.3	-41.2	-27.8	0.8	-46.9	0.3	-64.3
Feb	-27.4	-14.9	-38.9	-27.4	-1.2	-47.2	-1.7	-64.4
Mar	-28.4	-14.6	-40.3	-25.3	-0.1	-47	-0.3	-65
Apr	-14.1	1.7S	-35.3	-17	14	-39.7	7.9	-54.4
May	-7.6	7	-25.6	-5.3	19.8	-30.2	19.8	-39.7
Jun	5.4	28.2	-5.5	5.2	31.1	-12.1	30.3	-15.6
Jul	11.1	28.4	2.8	10.7	34.9	0.3	36.8	-6.2
Aug	7.9	17.1	0.6	8.8	29.2	-4.4	36.8	-11.8
Sept	0.9	10.2	-8.7	2.8	22.6	-18.9	22.7	-22.9
Oct				-7.2	13.4	-35.4	12.3	-46.5
Nov	-21	-8.5	-34.5	-19.6	2.8	-41	2.2	-54.1
Dec				-25.5	27.4	-44.5	-1.5	-61.5

S = More than one occurrence

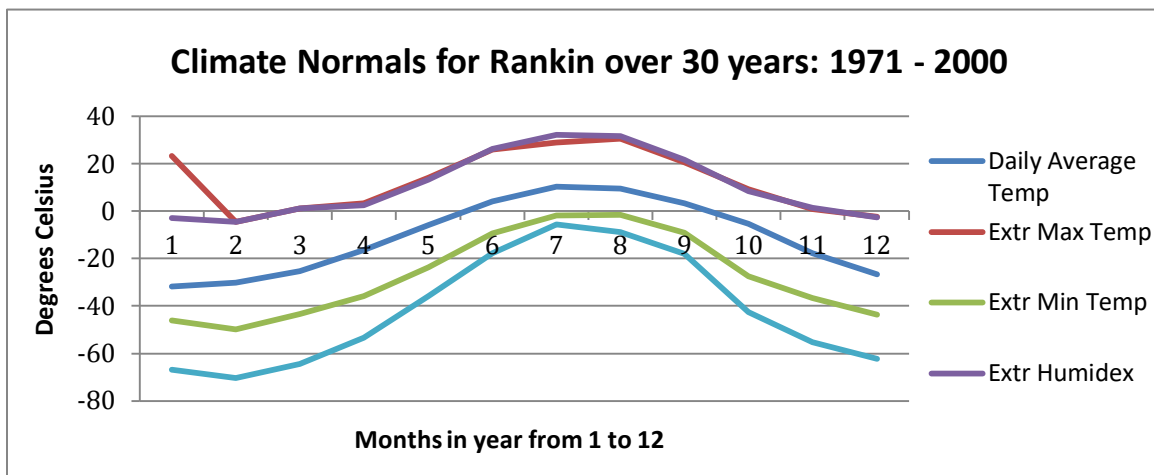


Rankin Inlet

Latitude: 62°49'00.000" N Longitude: 92°07'00.000" W Elevation: 32.30 m

Month	2007			Climate Normals (30 Years: 1971 - 2000)				
	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Daily Average Temp. °C	Extreme Maximum Temp. °C	Extreme Minimum Temp. °C	Extreme Humidex	Extreme Wind Chill
Jan	-27.8	-12.8	-40	-31.9	23.4	-46.1	-3	-66.8
Feb	-26.8	-11.9	-37.8	-30.1	-4.4	-49.8	-4.4	-70.5
Mar	-26.3	1	-39	-25.2	1.3	-43.4	1.1	-64.4
Apr	-13.9	-1.5	-31.2	-16.3	3.4	-35.7	2.5	-53.4
May	-7.4	3.7	-22.6	-5.9	14.1	-23.8	13.4	-35.9
Jun	3.1	24.2	-6.9	4.2	26.1	-9.4	26.3	-17.6
Jul	12.7	25.1	1.5	10.4	28.9	-1.9	32.2	-5.6
Aug	10.1	18.3	4.7	9.5	30.5	-1.4	31.8	-8.8
Sept	2.6	14	-4.1	3.4	20.6	-9	21.8	-18.1
Oct	-2.3	5	-16.0S	-5.3	9.3	-27.4	8.5	-42.7
Nov	-19	-3.4	-29.5	-17.8	0.9	-36.5	1.4	-55.3
Dec	-25.4	-13	-36.1	-26.7	-2.4	-43.6	-2.5	-62.4

S = More than one occurrence



Code of Practice

THERMAL CONDITIONS

Workers' Safety & Compensation Commission
Northwest Territories and Nunavut

WSCC Emergency Reporting
24-hour Incident Reporting Line

1 800 661-0792



If you would like this Code of Practice in another language, please contact us.