Cold Stress Program

This program outlines the U of A best practice for work in hot environments both indoors and outdoors.

Introduction and Scope

Environmental temperatures can have a significant impact on employees who work outdoors or in cold environments such as freezers. As it is a common occurrence during the winter months, it is important to assess the risk to employees. There are many controls to allow for work in a cold environment but there are extreme cases where work should be ceased. This document will help supervisors identify, assess and control cold stress as part of their hazard assessment.

In certain cases, employees may have underlying medical conditions or other limitations for working in the cold. These cases are outside the scope of this document and must be handled on a case by case basis with the employee, supervisor, human resources, and medical professionals.

For light duty (office or administrative) work in indoor environments where temperatures may be lower than normal for short periods, please see the Indoor Air Quality - Temperature document.

Legislative Requirements/Best Practices

For any indoor or outdoor work area, cold stress hazards may be present at low temperatures. The Cold Stress hazards must be assessed and controlled as per Part 2 of the Alberta OHS Code. This includes hazard identification, assessment, and control.

Hazard Identification

Cold Stress conditions can vary from day to day and even hour to hour and therefore must be looked at on a case-by-case basis. The following criteria are designed to help determine when Cold Stress conditions may need to be assessed.

1. Employee monitoring should begin when the temperature drops below -12 °C.
2. The air temperature drop below -25 °C or the wind chill factor (“feels like” temperature) drops below -27 °C.
3. Environment Canada or other governmental agency has released a cold advisory or warning.
4. Work in a low temperature environment such as freezer.

If any of the above conditions are met, a hazard assessment for cold stress must be completed.

Hazard Assessment

Conduct a hazard assessment for Cold Stress prior to work and at regular intervals as conditions change throughout the day.

To determine the risk of Cold Stress on employees, supervisors must look at the following factors.

1. Air Temperature, Wind Speed, or “Feels Like” (Wind Chill) temperature.
2. Sun Exposure
3. Clothing Requirements
4. Physical Workload

Please see the reference document “Assessing Cold Stress” for a method that can be used daily to assess Cold Stress.

Air Temperature, Wind Speed, or “Feels Like” (Wind Chill) Temperature

Air Temperature, Wind Speed, or “Feels Like” (Wind Chill) temperature are factors that can be used to estimate the impact of cold stress on the body. The risk of frostbite and other cold-related conditions is low until air temperature or the wind chill reaches -27 °C. If the wind chill temperature is not reported in your area, you can use the air temperature and the wind speed to determine the wind chill factor. See Assessing Cold Stress for more information.

Sun Exposure

Sunshine can make it feel warmer and reduce the wind chill by six to ten degrees. Where outdoor work is being conducted on a sunny day, the wind chill factor that is reported may be lower than the charts provided.

Clothing Requirements

On-the-job clothing requirements are key for worker protection. Due to the variable nature of weather it is important to dress in layers so workers can add or remove clothing as needed. The goal is to remain warm without sweating, as wet clothes can increase the risk in cold conditions.

Physical Workload

Physical workload can have a significant impact on the Cold Stress hazards that workers are exposed to. Workload helps to warm the body up, which minimizes the impact from the cold. But as you work, you also begin to sweat, and wet clothes can then increase the impact. It is important to find a balance between clothing and workload, and dressing in layers can allow workers to adapt to the situation as needed.

Health Hazards and Health Effects

There can be a huge variability in individual susceptibility to Cold Stress. It is important to understand the signs and symptoms of cold-related conditions to help minimize the effects on workers. These health effects include frostnip, frostbite, chilblains, immersion foot, trench foot, and hypothermia.

Frostnip - is characterized by the skin turning white and feeling number. This is typical on the ear lobes, nose, cheeks, fingers, and toes.

Frostbite - is caused by extreme cold or contact with extremely cold objects. It is characterized by pain, redness and swelling, and in severe cases burning and blistering can happen. Frostbite can lead to gangrene and infection so medical attention is required.

Chilblains - is a mild cold injury typically found in temperatures below 16 °C down to 0 °C. It causes redness, swelling, tingling and mild pain.

Immersion Foot - is caused by wet feet when it is not freezing cold. Exposure is typically days or weeks. Immersion foot may cause tingling, itching, pain, swelling, and blisters. The skin may turn from red to blue to purple as it gets worse.

Trench Foot - is caused by prolonged exposure in damp/wet and freezing conditions. Typically occurs in a number of hours or days.

Hypothermia - is when your core temperature starts to fall because your body is unable to keep up with the heat loss. The condition progresses starting with feeling cold, pain, numbness and muscle weakness, drowsiness and confusion. When the body temperature drops below 33°C, shivering may stop, and unconsciousness can set in at 27°C.

Managing Cold Stress

Work can be conducted safely during in cold environments. Best practice calls to use the hierarchy of controls to manage the hazards. This includes elimination, engineering, administrative, and personal protective equipment (PPE).

Elimination

Elimination includes removing the cold. In practical application, this may involve scheduling work during warmer periods when the hazard is not present.

Engineering Controls

Engineering controls for Cold Stress include changing the work environment. This may involve wind screens, temporary shelters, or providing a warm-up shelter.

Administrative Controls

Administrative controls for Cold Stress include changing how we do the work. This could involve:

- implementing a work-warmup schedule for employees
- education employees on Cold Stress, including the signs and symptoms of cold-related conditions
- signage, such as this Working in the Cold or Working in Extreme Temperatures infographics
- provision of water and/or electrolyte beverages to stay hydrated
- provision of additional breaks to warm up
- monitor employees for signs of cold-related conditions
- use a buddy system and have coworkers watch out for one another

- acclimatization, taking one to three weeks to get employees used to working in the cold by gradually increasing the amount of work they do in the cold environment each day.

Personal Protective Equipment

Personal protective equipment (PPE) for Cold Stress includes cold weather clothing and dress in layers.

The first layer of clothing should provide ventilation and allow moisture to escape. Sweat-wicking synthetic fabric or wool provide good protection. Cotton should be avoided as it stays wet and speeds up heat loss..

The middle layer(s) should be made of wool or fleece and provide an insulation layer. Additional layers can be added as required.

The outer layer should be windproof but should be capable of providing some ventilation. These may be zippered openings under the arms or on the sides of the jacket.

It is also important to protect your feet, hands, head and face. Mittens provide better protection than gloves where practical. Keep your head covered with a toque or hard hat liner. Facemasks or balaclavas can provide protection in very cold conditions. Pack extra socks to change when your socks get wet. Footwear should protect against both the cold and dampness. Liners inside the boot can be removed to dry, or changed throughout the day as needed. Technologies such as boot warmers can also assist in keeping boots warm and dry.

Record Keeping

Keep the most recent training records on file for the duration of the employee's employment, as applicable.

Document Review

This document will be reviewed at a minimum every 3 years, or when legislative changes are required.

References and Additional Information

Occupational Health and Safety Act, SA 2017, cO-2.1
https://work.alberta.ca/occupational-health-safety/ohs-act-regulation-and-code.html

Department of Environment, Health and Safety - University of Alberta
https://www.ualberta.ca/environment-health-safety

Government of Alberta. July 2014. "Best Practice - Working Safely in the Heat and Cold".
https://open.alberta.ca/dataset/dc0a7530-64d4-481a-a0c9-2f1c7107d8db/resource/b6c78e81-c91c-4cd2-a244-7b93c5862d6f/download/68946222014workingsafelyheatcold2014-07whs-pubgs006.pdf

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