Cold Stress Prevention Program

Purpose and Scope

Employees who are exposed to excessively cold temperatures or who work in cold environments may be at risk of cold stress. Various factors can contribute to cold stress such as low air temperature, cool high wind, dampness, and cold water. Cold stress can result in hypothermia, frostbite, or trench foot. This program has been developed to protect employees from cold-related illnesses while at work.

This program applies to all West Chester University employees who are exposed to or may become exposed to excessively cold temperatures during the course of their job duties.

Responsibilities

Environmental Health and Safety

- Assisting Departments in implementing the provisions of this program.
- Revising and updating the program as necessary.
- Providing training and educational resources regarding cold stress and illnesses;
- Performing cold stress exposure assessments for employees when necessary; and
- Provide guidance on selection and use of appropriate PPE.

Supervisors/Managers

- Ensuring employees are trained in identifying the signs and symptoms of cold stress;
- Providing emergency heat when necessary;
- Monitoring the wind chill index and pursuing, implementing, and enforcing the proper protective measures for employees as specified in this program;
- Implementing, and enforcing the use of proper protective equipment (PPE) for employees as specified in this Program;
- Assessing employees work load and assigning work and rest schedules as needed;
- Notifying EHS of specialized job tasks or environments as defined in this program that require a cold stress assessment;
- reporting occupational injuries and illnesses.

Employees

- Working in accordance with the provisions of this program;
- Understanding the signs and symptoms of cold stress;
- Notifying the supervisor if conditions exist that may lead to cold stress; and
- Notifying the supervisor if they begin to experience signs or symptoms of cold stress.

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Procedures: Cold Stress Signs, Treatment and Prevention

Signs and Treatment

As wind speed increases, it causes the cold air temperature to feel even colder and can cause heat to leave the body more rapidly (wind chill effect), this can increase the risk of cold stress to exposed workers, especially those working outdoors, such as recreational workers, snow cleanup crews, construction workers, and police officers.

When the body is unable to warm itself, serious cold-related illnesses and injuries may occur, and permanent tissue damage and death may result.

The most common health problems caused by cold work environments include:

- *Immersion/Trench foot* – Trench foot is a non-freezing injury of the feet caused by prolonged exposure to wet and cold conditions. It can occur in temperatures as high as 60°F if feet are constantly wet. Injury occurs because wet feet lose heat 25-times faster than dry feet.
  - *Signs/ Symptoms:* Reddening skin, tingling, pain, swelling, leg cramps, numbness, and blisters.
  - *Treatment:* Call 911 immediately in an emergency; otherwise seek medical assistance as soon as possible. Remove wet shoes/boots and wet socks. Dry the feet and avoid walking on them. Keep affected feet elevated and avoid walking. Seek medical attention.

- *Frostbite* – Frostbite is caused by the freezing of the skin and tissues. Frostbite can cause permanent damage to the body, and in severe cases can lead to amputation. The risk of frostbite is increased in people with reduced blood circulation and among people who are not dressed properly for extremely cold temperatures.
  - *Signs/ Symptoms:* Reddened skin develops gray/white patches in the fingers, toes, nose, or ear lobes; tingling, aching, a loss of feeling, firm/hard, and blisters may occur in the affected areas.
  - *Treatment:* Protect the frostbitten area, e.g., by wrapping loosely in a dry cloth and protect the area from contact until medical help arrives. DO NOT rub the affected area, because rubbing causes damage to the skin and tissue. Do not apply snow or water. Do not break blisters. DO NOT try to re-warm the frostbitten area before getting medical help, for example, do not use heating pads or place in warm water. If a frostbitten area is rewarmed and gets frozen again, more tissue damage will occur. It is safer for the frostbitten area to be rewarmed by medical professionals. Give warm sweetened drinks if alert (no alcohol).

- *Chilblains* - Chilblains are the painful inflammation of small blood vessels in the skin that occur in response to repeated exposure to cold but nonfreezing temperatures. Small blood vessels in the skin may become permanently damaged by cold temperatures, resulting in redness, and itching during additional exposures.
  - *Signs/ Symptoms:* Redness, itching, possible blistering, inflammation, and possible ulceration in severe cases.
  - *Treatment:* Avoid scratching. Slowly warm the skin. Use corticosteroid creams to relieve itching and swelling. Keep blisters and ulcers clean and covered.

- *Hypothermia* – Hypothermia occurs when the normal body temperature (98.6°F) drops to less than 95°F. Exposure to cold temperatures causes the body to lose heat faster than it can be produced. Prolonged exposure to cold will eventually use up the body's stored energy. The result is hypothermia, or abnormally low body temperature. Hypothermia is most likely at very cold temperatures, but it can occur even at cool temperatures (above 40°F) if a person becomes chilled from rain, sweat, or immersion in cold water.
  - *Signs/ Symptoms:* An important mild symptom of hypothermia is uncontrollable shivering, which should not be ignored. Although shivering indicates that the body is losing heat, it also helps the body to rewarm itself. Moderate to severe symptoms of

hypothermia are loss of coordination, confusion, slurred speech, heart rate/breathing slow, unconsciousness and possibly death. Body temperature that is too low affects the brain, making the victim unable to think clearly or move well. This makes hypothermia particularly dangerous because a person may not know what is happening and won't be able to do anything about it.

- *Treatment:* Call 911 immediately in an emergency: Move the worker to a warm, dry area. Remove any wet clothing and replace with dry clothing. Wrap the entire body (including the head and neck) in layers of blankets; and with a vapor barrier (e.g. tarp, garbage bag) Do not cover the face. If medical help is more than 30 minutes away: Give warm sweetened drinks if alert (no alcohol), to help increase the body temperature. Never try to give a drink to an unconscious person. Place warm bottles or hot packs in armpits, sides of chest, and groin. Call 911 for additional rewarming instructions.

Prevention

While cold stress can be dangerous and potentially life threating, it can be prevented. Prevention methods include:

- *Acclimation* – Employees gradually acclimatize when exposed to cold conditions. This may take several weeks. When the wind chill is low, special precautions are needed to protect un-acclimatized employees while they adjust to the cold particularly on the first few days they are exposed to cold conditions. Supervisors should monitor employees closely for signs of cold stress during this period and they should adopt appropriate work-rest schedules for these employees, starting with longer rest periods, that are adjusted over a two-week period. Re-acclimatization may also be necessary when employees are away from the cold conditions for a few days. A new employee should not be required to work in the cold for an extended period during the first days of employment until they become adjusted to the working condition and required protective clothing. New employees should be introduced to the work schedule slowly and be trained accordingly.

- *Engineering Controls* – For employees working indoors, the best way to prevent cold-related illness is to make the work environment warmer. Where and if possible, use heating to warm the work area. However, avoid the use of space heaters when possible as there is a potential for a fire hazard (see *Use of Portable Electric Space Heaters- contact EHS for document*). Additionally, equipment to reduce drafts and condensation can be installed. Air velocity should be minimized and not exceed 200 FPM. For outdoor locations If available, use wind barricades to block the wind from the employees.

- *Safe Work Practices* – For employees working outdoors without heat, scheduled breaks in warm areas are appropriate (Appendix B). Employees should drink warm sweet beverages and take breaks in warm areas as needed. Supervisors should consider scheduling the most work for the warmest part of the day, assigning extra employees to high demand tasks that will require longer periods in cold areas. All employees should watch out for the safety of their coworkers and work in pairs, if possible.

- *Personal Protective Equipment* – PPE is an important factor in preventing cold-related illnesses and injuries. Employees should adhere to the following recommendations when dressing for work in a cold environment: Wear at least three layers of clothing; an inner layer of wool, silk, or synthetic to wick moisture away from the body; a middle layer or wool

or synthetic to provide insulation even when wet; an outer wind and rain protection layer that allows some ventilation to prevent overheating. Wear a hat or hood (up to 40% if body heat can be lost when the head is left exposed). Wear insulated boots or other footwear and wool socks. Do not wear tight clothing (loose clothing provides better ventilation); and Keep a change of clothing available in case work clothes become wet.

Training

Employees who may be exposed to extreme cold conditions must receive training prior to working in such conditions. An online training module is available through EHS. This training will cover the general safety precautions related to cold stress. However, employees must still be trained on any additional precautions specific to their equipment or work areas.

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Appendix A: Wind Chill Index

Outdoor workers exposed to cold and windy conditions are at risk of cold stress, both air temperature and wind speed affect how cold they feel. Wind Chill is the term used to describe the rate of heat loss from the human body, resulting from the combined effect of low air temperature, and wind speed. The Wind Chill Temperature is a single value that takes both air temperature, and wind speed into account. For example, when the air temperature is 40°F, and the wind speed is 35mph, the wind chill temperature is approximately 20°F; this measurement is the actual effect of the environmental cold on the exposed skin. Wind chill can be estimated using the table below.