Preventing Cold Stress and Cold Induced Injuries

Winter weather creates a variety of hazards and risks that can significantly impact everyday tasks and work activities. People that are outdoors in cold environments for extended periods of time can be at risk for Cold Stress. Those at risk include home owners shoveling driveways, winter sports enthusiasts, and workers with outdoor winter responsibilities – snow cleanup crews, recreational workers, construction teams, emergency response personnel, firefighters, police officers, transportation personnel, and more.

Cold Stress occurs when the skin temperature, and eventually the internal body temperature (core temperature), is driven down. This can lead to serious health problems, tissue damage, and possibly death. A cold environment forces the body to work harder to maintain its temperature and most of the body's energy is used to keep the internal core temperature warm. Over time, the body shifts blood flow from the extremities (hands, feet, arms, and legs) and outer skin to the core. This shift allows the exposed skin and extremities to cool rapidly and increases the risk of frostbite, trench foot, and hypothermia.

Risk Factors that Contribute to Cold Stress.
- Wetness/dampness
- Dressing improperly
- Exhaustion
- Health conditions such as hypertension, hypothyroidism, and diabetes
- Poor physical conditioning

Most Common Cold Induced Illnesses & Injuries.
- Hypothermia, the most dangerous cold induced injury, occurs when body heat is lost faster than it can be replaced and the normal body temperature drops to less than 95°F. Hypothermia is most likely at very cold temperatures, but it can occur if a person becomes over-chilled from rain, sweat, or submersion in cold water. Early symptoms include shivering, fatigue, loss of coordination, confusion, and disorientation. Late symptoms include no shivering, blue skin, dilated pupils, slowed pulse, slow breathing, and loss of consciousness.
- Frostbite is caused by the freezing of skin and underlying tissues. The lower the temperature, the more quickly frostbite will occur. Frostbite causes a loss of feeling and color in the affected areas. It most often affects the nose, ears, cheeks, chin, fingers, or toes. Amputation may be required in severe cases. Symptoms include reduced blood flow, numbness, tingling or stinging, aching, or bluish-pale-waxy skin.
- Trench Foot is caused by prolonged exposure to wet and cold temperatures. Wet feet lose heat 25-times faster than dry feet. To prevent heat loss, the body constricts the blood vessels to shut down circulation in the feet. The skin tissue begins to die because of a lack of oxygen and nutrients and due to the buildup of toxic products. Symptoms include reddening of the skin, numbness, leg cramps, swelling, tingling pain, blisters or ulcers, bleeding under the skin, and gangrene.

Preventing Cold Stress and Cold Induced Illnesses & Injuries.
Following these guidelines for safely working outside in extreme temperatures and dressing properly for winter weather can help to prevent cold stress and cold induced illnesses/injuries from happening.

Safety Guidelines for Winter Working.
- Know the symptoms of cold stress.
- Monitor your physical condition and that of others.
- Stay dry.
- Keep extra clothing handy in case you get wet and need to change.
- Work during the warmest part of the day.
- Take frequent breaks to allow the body to warm up.
- Use the buddy system.
- Drink warm sweetened fluids (no alcohol).
- Include a thermometer and chemical hot packs in your first aid kit.
- Avoid touching cold metal surfaces with bare skin.
- Dress properly for the cold.
- Employees: Use proper engineering controls, safe work practices, and personal protective equipment (PPE).

Guidelines for Dressing Properly for Cold Weather.
Dressing correctly and wearing appropriate clothing is extremely important to preventing cold stress. These guidelines and recommendations can help reduce the risk of cold stress:

- Wear at least three layers of loose fitting clothing. Layering provides better insulation. Do not wear tight fitting clothing. The type of fabric worn matters.
  1. Inner layer of wool, silk or synthetic to keep moisture away from the body.
  2. Middle layer of wool or synthetic to provide insulation even when wet.
  3. Outer wind and rain protection layer that allows some ventilation to prevent overheating.
- Wear a hat or hood to help keep your whole body warmer.
- Use a knit mask to cover the face and mouth (if needed).
- Use insulated gloves to protect the hands (water resistant if necessary).
- Wear insulated and waterproof boots (or other footwear).

For Employers. OSHA does not have a specific standard that covers working in the cold, however under the Occupational Safety and Health Act (OSH Act) of 1970, employers have a duty to protect workers from recognized hazards, including cold stress hazards, that are likely to cause death or serious physical harm in the workplace. Employers should train workers to recognize the conditions that can lead to cold stress and train workers to prevent cold stress. Workers should also be trained to recognize the symptoms of cold stress and to help those who are affected with cold stress. Additionally, employers should provide guidelines for selecting the proper clothing for cold, wet, and windy conditions. Providing safety tips and guidelines to employees for how to safely work and dress for winter can help to prevent cold stress and cold induced illnesses/injuries from happening.