

Cold Injuries



Health Hazard Information Card HH-25

Although cold weather is the leading cause of cold injuries, substances which may be used in a mining environment will cause similar damage.

HYPOTHERMIA, an extreme loss of body heat, results in cold injuries, which are divided into two general groups:

- ❄️ **EARLY** or superficial local cold injury (without tissue freezing):
 - » **Chilblains** is the most common type of cold injury which occurs with exposure to a dry cold. The symptoms include itching, swelling, pain, and a reddish-blue tinge to the skin. In time, blisters may form. Although there is usually no permanent damage, the injured area may be quite sensitive to cold after this exposure.
 - » **Trench foot**, also known as immersion injury, is a result of exposure to a cold, wet environment. Often this occurs when a glove or sock becomes wet. The symptoms are similar to those of chilblains, but the damage is usually more serious. The blisters are deeper and resemble blisters that form after being burned. However, other than continuing cold sensitivity, there is usually no lasting impairment although severe cases have led to amputation.
- ❄️ **LATE** or deep local cold injury (with tissue freezing):
 - » **Frostbite** occurs when an area of the body freezes, and ice crystals form within the cells. These crystals cause the cells to rupture, leading to cell death. The degrees of frostbite are:

- » First degree – frostnip. This begins with itching and pain, followed by “blanching” (loss of blood supply) of the skin and eventual numbness. Because only the top layers of skin are involved, frostnip does not lead to long-term damage other than cold sensitivity.
- » Second degree – skin freezes and is hard to the touch, although the deepest layers are still unaffected. After 1-2 days, hard blackened blisters form. They look worse than they are as a rule, but should be looked at by a health care practitioner. Most of these injuries heal in 3-4 weeks.
- » Third or fourth degree – deep frostbite occurs. This affects all the muscles, tendons, blood vessels, and nerves. The exposed area hardens and feels woody, with temporary loss of use of involved parts. In severe cases, this loss may be permanent. The injured segment will be deep purple or red with blisters; usually these blisters are filled with blood. It is at this stage that fingers and toes can be lost. However, it may take several months to determine how much tissue must be surgically removed.

Substances Which Cause Frostbite

At a mine site, there are some substances which may cause frostbite and other injuries. Among these are *liquid anhydrous ammonia and hydrogen compounds*. Treatment should follow guidelines on an MSDS, if available, and professional care must be obtained without delay.

Those at Risk of Cold Injuries

In a mining environment, anyone working outdoors in the cold is susceptible. Those with small hands and feet or poor circulation are more likely to be affected. Some medications depress the ability to sense cold accurately – that is, to recognize the depth of coldness. Beta-blockers are one of the medications that reduce the circulation to the hands and feet. Alcohol, besides impairing judgment, causes the skin to flush, allowing warm blood to become cooled at the surface of the skin. This causes faster heat loss.

Prevention

The best preventions are:

- ❄️ dress warmly in layers of clothing
- ❄️ choose fabrics that dry quickly and allow air to move through
- ❄️ wear waterproof and insulated boots
- ❄️ change socks and shoes/boots when wet
- ❄️ keep hands warm and dry; wear mittens, gloves, and/or glove liners
- ❄️ keep clothes clean (dirty clothing packs down; does not insulate or allow air movement and evaporation)
- ❄️ keep ears and head covered; wear a winter liner with a hard hat
- ❄️ move indoors when fingers and toes feel cold
- ❄️ stay dry

For cold injuries, handle injured tissue gently – DO NOT RUB the area. Also DO NOT attempt to thaw any frozen tissue if there’s a risk of refreezing. Seek professional help without delay.

REMEMBER: dressing warmly, covering extremities, and remaining alert to the surroundings are the best ways to prevent cold injuries. Also, cold injuries – even frostbite – can occur at temperatures above freezing (32°F; 0°C) if there is high wind or wetness.

For additional information and assistance, contact:

- » Your local MSHA office
- » **Metal/Nonmetal Mine Safety and Health**
Arlington, Virginia
202-693-9630
- » **Coal Mine Safety and Health**
Arlington, Virginia
202-693-9510
- » **Pittsburgh Safety and Health Technology Center**
Pittsburgh, Pennsylvania
412-386-6902