

Monitoring Monday – Let’s look at cold stress.

Join us each Monday as the Clean Water Team shares information and resources on water quality monitoring. This Monday we will look at cold stress.

People who are exposed to extreme cold or work in cold environments may be at risk of cold stress. Extreme cold weather is a dangerous situation that can bring on health emergencies in susceptible people and outdoor workers. Whenever temperatures drop decidedly below normal and as wind speed increases, heat can more rapidly leave your body. These weather-related conditions may lead to serious health problems.

Cold stress can be prevented. It is important for employers and volunteer program leaders to know the wind chill temperature so that they can gauge workers’ exposure risk better and plan how to safely do the work. It is also important to monitor workers’ physical condition during tasks, especially new workers who may not be used to working in the cold, or workers returning after spending some time away from work.



Alpine Watershed Group
www.alpinewatershedgroup.org/

Environmental cold can affect any worker exposed to cold air temperatures and puts workers at risk of cold stress. As wind speed increases, it causes the cold air temperature to feel even colder, increasing the risk of cold stress to exposed workers, especially those working outdoors.

- **Cold Stress – Recommendations**
 - Schedule maintenance and repair jobs in cold areas for warmer months.

- Schedule cold jobs for the warmer part of the day.
- Reduce the physical demands of workers.
- Use relief workers or assign extra workers for long, demanding jobs.
- Provide warm liquids to workers.
- Provide warm areas for use during break periods.
- Monitor workers who are at risk of cold stress.
- Provide cold stress training that includes information about:
 - Worker risk
 - Prevention Symptoms
 - The importance of monitoring yourself and coworkers for symptoms
 - Four of the most common cold stress-related hazards are trench foot, hypothermia, frostbite , and chilblains.
 - Treatment
 - Personal protective equipment

Cold Stress-Related Hazards

Chilblains are the painful inflammation of small blood vessels in your skin that occur in response to repeated exposure to cold but not freezing air. Chilblains can cause itching, red patches, swelling and blistering on your hands and feet. The lesions typically appear 12-24 hours after exposure to cold. They don't usually result in permanent injury and usually go away on their own in 2 to 3 weeks. But the condition can lead to infection, which may cause severe damage if left untreated. The best approach to chilblains is to avoid developing them by limiting your exposure to cold, dressing warmly and covering exposed skin.

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. The condition first became known during World War I, when soldiers got trench foot from fighting in cold, wet conditions in trenches without the extra socks or boots to help keep their feet dry.

- What are the symptoms of trench foot?
 - Reddening skin
 - Tingling
 - Pain
 - Swelling
 - Leg cramps
 - Numbness
 - Blisters



Protecting Workers from Cold Stress

Cold temperatures and increased wind speed (wind chill) cause heat to leave the body more quickly, putting workers at risk of cold stress. Anyone working in the cold may be at risk, e.g., workers in freezers, outdoor agriculture and construction.

Common Types of Cold Stress

Hypothermia

- Normal body temperature (98.6°F) drops to 95°F or less.
- **Mild Symptoms:** alert but shivering.
- **Moderate to Severe Symptoms:** shivering stops; confusion; slurred speech; heart rate/breathing slow; loss of consciousness; death.

Frostbite

- Body tissues freeze, e.g., hands and feet. Can occur at temperatures above freezing, due to wind chill. May result in amputation.
- **Symptoms:** numbness, reddened skin develops gray/white patches, feels firm/hard, and may blister.

Trench Foot (also known as Immersion Foot)

- Non-freezing injury to the foot, caused by lengthy exposure to wet and cold environment. Can occur at air temperature as high as 60°F, if feet are constantly wet.
- **Symptoms:** redness, swelling, numbness, and blisters.

Risk Factors

- Dressing improperly, wet clothing/skin, and exhaustion.

For Prevention, Your Employer Should:

- Train you on cold stress hazards and prevention.
- Provide engineering controls, e.g., radiant heaters.
- Gradually introduce workers to the cold; monitor workers; schedule breaks in warm areas.

For more information:



U.S. Department of Labor
www.osha.gov (800) 321-OSHA (6742)

OSHA 3156-02R 2014



How to Protect Yourself and Others

- Know the symptoms; monitor yourself and co-workers.
- Drink warm, sweetened fluids (no alcohol).
- Dress properly:
 - Layers of loose-fitting, insulating clothes
 - Insulated jacket, gloves, and a hat (waterproof, if necessary)
 - Insulated and waterproof boots

What to Do When a Worker Suffers from Cold Stress

For Hypothermia:

- Call 911 immediately in an emergency.
- To prevent further heat loss:
 - Move the worker to a warm place.
 - Change to dry clothes.
 - Cover the body (including the head and neck) with blankets, and with something to block the cold (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).
 - Apply heat packs to the armpits, sides of chest, neck, and groin. Call 911 for additional rewarming instructions.

For Frostbite:

- Follow the recommendations "For Hypothermia".
- Do not rub the frostbitten area.
- Avoid walking on frostbitten feet.
- Do not apply snow/water. Do not break blisters.
- Loosely cover and protect the area from contact.
- Do not try to rewarm the area unless directed by medical personnel.

For Trench (Immersion) Foot:

- Remove wet shoes/socks; air dry (in warm area); keep affected feet elevated and avoid walking. Get medical attention.

For more information:



U.S. Department of Labor
www.osha.gov (800) 321-OSHA (6742)

OSHA Quick Card for Protecting Workers from Cold Stress
www.osha.gov/sites/default/files/publications/OSHA3156.pdf

Frostbite is a bodily injury caused by the freezing of specific body parts, particularly smaller areas like fingers, ears, and toes. Those exposed to extreme cold can be susceptible to frostbite in a matter of minutes, according to the National Weather Service (NWS). Exposed skin in cold,

windy weather is most vulnerable to frostbite, but it can affect skin covered by gloves or other clothing. You may not realize you have frostbite until someone else points it out.

- The symptoms of frostbite include:
 - Skin discoloration – blue, white, or grayish-yellow patches
 - Cold, firm, or waxy skin
 - Numbness
 - Clumsiness due to joint and muscle stiffness
 - Blistering after rewarming in severe cases

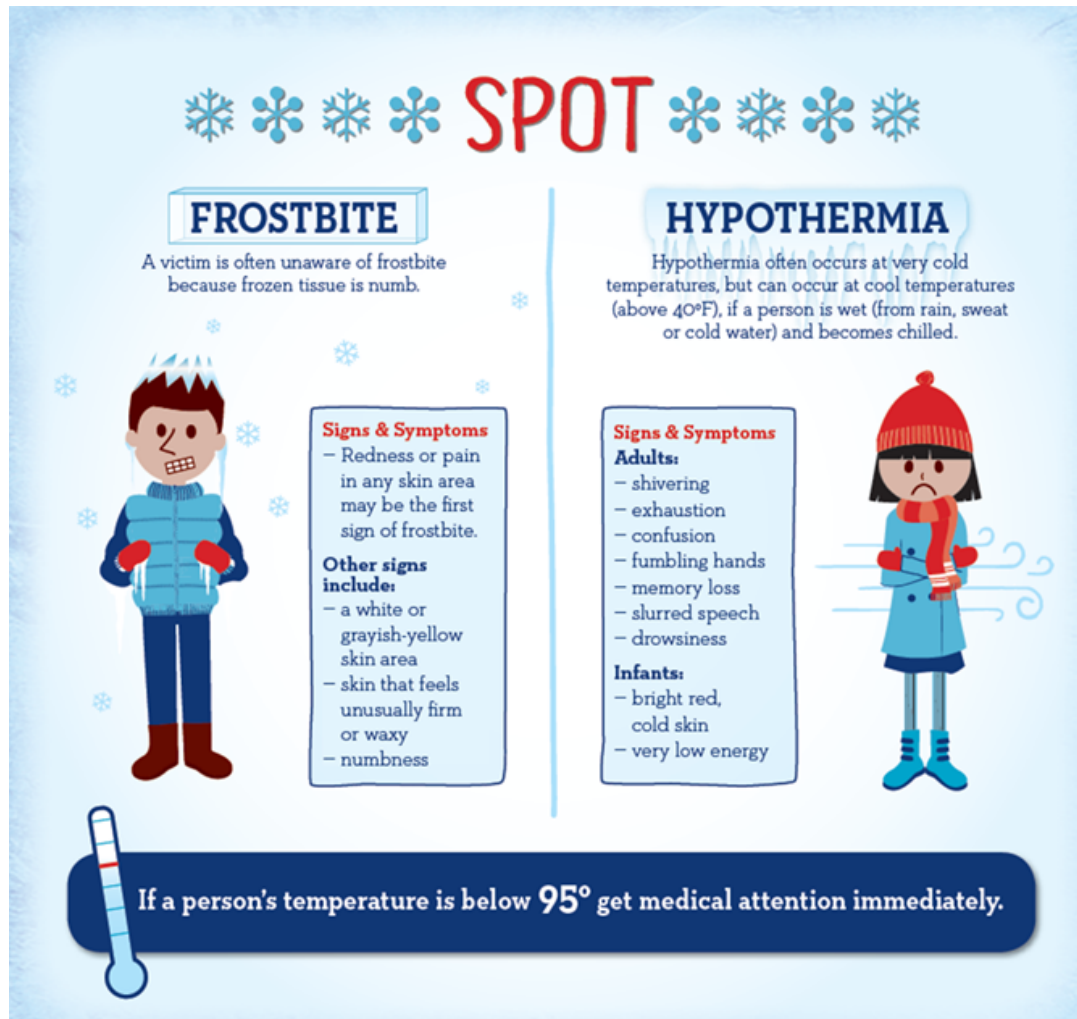
Frostbite treatment mirrors much of the treatment for hypothermia. Victims should again be gently moved to a warm place. Frostbitten areas should be assessed and then soaked in warm water until the area feels warm to touch. CDC recommends not to use or rub frostbitten areas, as this can cause more damage. Frostbite victims, like hypothermia victims, should also be warmed slowly and should not be exposed to direct heat sources like heating pads, lamps, or stoves. Because the victim's frostbitten areas are likely numb, he/she will not be able to feel burns.

Arguably one of the most dangerous and well-known results of cold stress is **hypothermia** (abnormally low body temperature). Hypothermia occurs when the normal body temperature (98.6°F) drops to less than 95°F. When exposed to cold temperatures, the body begins to lose heat faster than it's produced. Lengthy exposures will eventually use up the body's stored energy, which leads to lower body temperature. A body temperature that is too low affects the brain, making the victim unable to think clearly or move well. This makes hypothermia especially dangerous, because a person may not know that it's happening and won't be able to do anything about it. While hypothermia is most likely at very cold temperatures, it can occur even at cool temperatures (above 40°F) if a person becomes chilled from rain, sweat, or submersion in cold water.

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
- Exhaustion
- Confusion or memory loss
- Slurred speech, drowsiness, limited movement
- Heart rate/breathing slow,
- Unconsciousness and possibly death



Frostbite & Hypothermia Infographic
www.cdc.gov/cpr/infographics/ast-frostbite.htm

Hypothermia is a medical emergency. If you notice any of the above signs, take the person's temperature. If it is below 95° F, get medical attention immediately! While waiting for medical attention, hypothermia treatment begins with slowly warming the victim. Gently move the victim into a warm area and remove any wet clothing. The center of the body – such as the chest, head, and neck – should be warmed first using layers of dry blankets or clothing. Trying to warm the victim's feet or hands before the body's center may cause shock. Warm, nonalcoholic and noncaffeinated beverages may also be provided to a conscious victim.

References and Resources:

Chilblains

www.mayoclinic.org/diseases-conditions/chilblains/symptoms-causes/syc-20351097

www.nhs.uk/conditions/chilblains/

<https://rarediseases.org/rare-diseases/perniosis/>

Cold Stress

<https://afophs.wordpress.com/2017/01/04/heat-stresswhat-about-cold-stress/>

www.cdc.gov/cpr/infographics/ast-frostbite.htm

www.cdc.gov/niosh/docs/wp-solutions/2019-113/default.html

www.cdc.gov/niosh/docs/wp-solutions/2019-113/default.html

www.cdc.gov/niosh/topics/coldstress/

www.osha.gov/sites/default/files/publications/OSHA3156.pdf

Frostbite

www.hopkinsmedicine.org/health/conditions-and-diseases/frostbite

<https://kidshealth.org/en/parents/frostbite.html>

www.mayoclinic.org/diseases-conditions/frostbite/symptoms-causes/syc-20372656

Hypothermia

www.betterhealth.vic.gov.au/health/healthyliving/hypothermia

www.cdc.gov/disasters/winter/staysafe/hypothermia.html

www.mayoclinic.org/diseases-conditions/hypothermia/symptoms-causes

Trench Foot

www.cdc.gov/niosh/docs/wp-solutions/2019-113/default.html

www.foot-pain-explored.com/trench-foot.html

www.healthline.com/health/trench-foot

www.sciencedirect.com/topics/medicine-and-dentistry/trench-foot

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Erick Burres

[Clean Water Team Coordinator](#)

[California Water Quality Collaboration Network Facilitator](#)

[Safe to Swim Network Co-facilitator](#)

erick.burres@waterboards.ca.gov

213 712 6862 mobile

Mailing address:

Erick Burres – Clean Water Team

C/O SARWQCB

3737 Main Street, Suite 500

Riverside, CA 92501-3348

