

Occupational Hazards

THE AUTHORITY ON OCCUPATIONAL SAFETY, HEALTH AND LOSS PREVENTION

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Don't Leave Safety Out in the Cold

With winter looming just around the corner, outdoor workers are at risk of getting cold stress if the proper controls to minimize cold weather hazards are not in place.

By Katherine Torres

The autumn season is upon us now, marking the transition from the sweltering temperatures of summer to the wet, blustery and icy weather conditions of winter. For workers - especially those who must spend part or all of their time outdoors - winter weather can be deadly.

In the winter months, construction workers, police and fire department personnel, mail carriers, transportation workers and any other workers whose occupations involve outdoor work are at the whim of Mother Nature. Cruel winds, temperatures that sometimes dip into the single and even negative digits, snow and freezing rain and sleet can cause workers to suffer from cold stress.

While much attention is paid to heat stress and its potentially deadly effects, very little is paid to cold stress. Prolonged exposure to cold weather can invite an onslaught of injuries as serious as frostbite - an irreversible condition in which the exposed part of the skin freezes - hypothermia and even death. In addition, prolonged exposure to cold weather can lead to other types of ailments. For example, exposure to cold can aggravate existing medical conditions such as arthritis, increase the risk of musculoskeletal injuries and affect dexterity, mental skills and coordination.

Despite the laundry list of hazards and ailments associated with cold stress, there are steps both workers and employers can take to minimize its risks. Leading safety and health experts share information about the causes of cold stress and what administrative and engineering controls employers can implement to protect workers.

Coping With Temperature Changes

Working in cold weather has its range of complexities. The most curious aspect of cold stress is that it doesn't necessarily have to happen to workers on construction sites in Alaska or Minnesota, where winters are notoriously cold. In fact, cold stress

mostly affects employees who work and live in places where the seasons change.

According to the American Industrial Hygiene Association, the most critical and crucial time with respect to cold weather and related disorders are the very first cold days of winter or an unexpected drastic change in temperature. In these cases, the body still may not have adjusted to the new environmental conditions or workers may not be properly attired for unexpected temperature drops.

"People who work in predominately cold states are prepared for this type of [cold] weather," says Allen Abrahamsen, assistant vice president of Construction Safety Services for ESIS Risk Control Services. "In warmer or multi-climate states where you have the four seasons, you don't realize as much that you are in a cold environment below 30 degrees and how it's going to affect you."

People who live and work in environments that are consistently cold are more accustomed to the weather and have learned to dress in layers, says Abrahamsen. They know how often they need to take breaks to warm up and what beverages and foods they need to avoid to maintain a higher body temperature.

Alcohol, caffeine and tobacco, for instance, are big no-nos, as they can cause the body to dehydrate faster during cold weather.

Even after a worker who isn't accustomed to cold weather learns and understands that there are certain control measures he needs to take in order to prevent cold stress, it may not be enough. "Unless it is drilled into their heads and repeated over and over, they [workers] might not get it," Abrahamsen says.

Just ask workers from the Kenai, Alaska-based ConocoPhillips' Tyonek Platform, who have to live and work around freezing temperatures that dip as low as minus 50 below zero with the occasional

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blizzard thrown in to limit work operations. Having to adapt to tough weather conditions in their everyday life have made the Tyonek Platform workers pros in very efficiently protecting themselves against cold stress, according to ConnocoPhillips' safety specialist Tom Strothers.

"The plain fact is that most folks are aware that it is pretty cold out," he says. "We have PPE available and we provide information about layering and other precautions they should take. Mostly though, we leave it up to them as thinking, free-minded individuals."

Workers, he says, are the first ones to bring up issues of cold-weather protection to their supervisor if they feel it necessary, Strothers emphasizes. For instance, on icy days, workers and management will work together to ensure that the ice gets melted to prevent hazardous slips and falls. The fact that employees and company management have such an open dialogue about safety contributed to ConocoPhillips earning Star status in OSHA's Voluntary Protection Program (VPP) on Oct. 17.

But this doesn't mean that ConocoPhillips leaves cold weather protection completely to the worker, Strothers asserts. When the employees first enter the company workforce, they learn about the importance of wearing multiple layers, especially when working outside. As part of that training, they are advised to take a number of breaks, the number of which, according to Strothers, depends on temperature outside.

Even with proper training, education and protective clothing, if temperatures outside drop below minus 35 below zero, most of the company's outdoor equipment operations either will shut down or, if possible, move indoors.

Workers also are shown how to create warm enclosures for themselves when working outside. If workers are outside doing electrical work on new construction, for example, they will wrap industrial plastic around the exterior of the area they are working in or provide a heater to warm up the area.

Cold Stress Just as Dire as Heat Stress

Having company management understand how cold weather can affect a worker, not only physiologically,

but also in production capacity, can make a huge difference in the way workers can better protect themselves from cold stress, Abrahamsen notes. He adds that there is a greater need for education and awareness in this area.

"Upper management should understand that not all conscious decisions made by workers are their best in cold temperatures," he says. "The reason why is because general product management and owners don't spend a lot of time working in the workers' shoes."

Perhaps part of the reason is because when it comes to battling extreme temperatures, cold stress is a different animal. For the most part, it seems that companies have the issue of cold stress under control, as the rate of cold stress isn't as prevalent as heat stress.

One explanation could be that when temperatures start to dip down to below 60 degrees, people aren't fearing for their safety, according to Vic D'Amato, CIH, CSP and director of the Reston, Va.-based Atrium Environmental Health and Safety Services. Workers may be uncomfortable, but they don't pause to think that the constant shivering can be the first signs of cold stress, D'Amato says. But, he adds, cold stress is not less hazardous than heat stress.

"[Cold stress] is an occupational hazard and it doesn't get as much attention, probably not because you don't hear about it as much, but because the signs and symptoms aren't as dramatic," he says.

According to D'Amato, the first sign of hypothermia is intense shivering, which isn't an uncommon reaction to the bitter cold the winter months can bring. But as the body temperature continues to drop, even a few degrees below its normal temperatures of 98.6 degrees, the body uses its defense mechanisms to help maintain its core temperature. In addition to shivering, which generates heat by speeding up the body's metabolic rate, the body also will begin to shift blood flow away from the extremities (hands, feet, arms and legs) and outer skin to the core (chest and abdomen). This allows exposed skin and extremities to cool rapidly and increases the risk of frostbite and hypothermia. Combine these factors with cold water and trench foot, a painful inflammation of the foot after being exposed to water, can occur.

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Symptoms Can Have Long-Term Effects

Dr. Robert Blink, an occupational and environmental medicine specialist for the health provider WorkCare Inc., has seen his share of victims with cold stress. Although none of his patients has had such a severe case that their lives were threatened, he does recall one instance in which a mild case of frostbite, also called frostnip, produced long-term effects for the patient.

A utility worker came to see Blink after working out in the field on a cold and windy 15-degree day. He had proper protective clothing on, Blink remembers, except on his head, where he only wore a hard hat. As a result, when he came out of the cold for a break, his ears started to become very painful. By the time Blink saw him, the worker's ears were "red, swollen and almost as thick as my hand."

"What was happening was that the cold was making his ears numb, which is the first sign of frostnip," Blink says. "When he came in, the blood flow was starting up again, producing the pain he was feeling." The worker later experienced some blistering, as the frostnip damaged some of the tissue on the skin's surface. Also, the worker could continue to have long-term increased sensitivity to the cold because of that earlier exposure, which means that each time it gets cold, he will experience pain in his ears.

Hypothermia: When Cold Turn Deadly

The most dangerous consequence of getting frostbite/frostnip or hypothermia is that employees working alone or who are unaware of their worsening physical conditions are unable to get help.

"When hands and fingers get numb and if the body temperature drops, they become exhausted and immobilized and it may speed up the effects of cold weather," says Blink.

For this reason, he recommends implementing a buddy system so workers on the same crew can watch out for any tell-tale signs of cold stress. Blink also stresses that careful supervision, either by a supervisor or safety and health officer, is critical to ensure that a worker gets through the day without developing symptoms of cold stress.

Supervision and a buddy system also are important

because when workers suffer from cold stress, they tend to lose their motor coordination, causing them to not only potentially hurt themselves, but also to place others in danger.

"One of the things that struck me while I was out on a construction site was that somebody told me to watch out for the 'umbles,'" Abrahamsen says. "If watching someone in cold weather, make sure he or she is not stumbling, not mumbling, not fumbling or not grumbling."

Catch someone doing any of the above actions and Abrahamsen says, "They aren't on top of their game" and are at risk of injury.

Measures to Protect Workers

Abrahamsen and D'Amato recommend that employers implement certain measures to ensure the safety of their workers. First, according to D'Amato, companies should monitor wind chill and temperature. The wind chill factor, he says, can intensify the effects of cold stress. For instance, even if the temperature is a tolerable 40 degrees above zero, if the wind velocity is 10 miles per hour, the combination could cause the person to lose heat.

"Knowing the wind chill factor is extremely important because the effects of it could be dramatic," D'Amato states. "And it will help employers understand what these things mean and when to cease operations when it's too cold to work."

It also is important to understand that cold stress is just one of several cold-weather hazards, says D'Amato. When the weather grows chilly and the roads get icy due to accumulation of freezing rain and sleet, there is an increase of motor vehicle accidents as well as slips, trips and falls. According to the National Highway Traffic Safety Administration (NHTSA), approximately 130,000 motor vehicle crashes occur each year during sleet and snowy conditions. Of these crashes, some 30,000 result in injuries; hundreds result in deaths.

PPE: Precautions Against the Cold

According to Howard Huber, marketing manager with the St. Paul, Minn.-based manufacturer Ergodyne, workers should remember that when temperatures outside start to get cool, it impacts the surface tem-

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peratures of the tools they use, which can increase the likelihood of injury. If the surface temperature of a tool that has no insulative properties dips down to 60 degrees, workers will start to receive limited circulation to their hands, wrists and arms, increasing their chances of suffering ergonomic injuries.

Cold weather especially is harsh on workers who suffer from hand-arm vibration syndrome (a condition prevalent among workers who use power drills, chainsaws and other vibrating tools). The symptoms of the syndrome include “white finger,” which is an episodic blanching of the fingers in response to cold, Huber says.

“This syndrome is exacerbated when it gets really cold and wet, so you want to stay dry and warm so that you keep circulation in your hands,” he adds.

Although it is a well-known fact that PPE is the last line of defense against a workplace hazard, Huber emphasizes that it is the most significant precaution an employee can take to reduce cold stress.

Huber, who is an expert on the types of PPE workers should wear in very cold temperatures, recommends that workers either insulate the tools they are working with or wear gloves that have an insulating liner. The best types of gloves, Huber says, are the ones that are not only warm, but also provide a lot of dexterity and movement so that workers can continue to efficiently do their jobs.

In addition to well-insulated gloves, thermal layers are helpful. The inner layer of clothing should be made of materials such as polypropylene that draw moisture (perspiration) to the outside. The middle layers should be constructed of materials like wool or Thinsulate that provide insulation without adding significant weight. The outer layer of clothing is used for wind and water protection and should be water repellent. These fabrics, such as Gore-Tex, are breathable, allowing body heat to be released and providing easy evaporation of moisture.

Lastly, as 30 percent of the body heat is lost through the head, hats, hoods and facemasks should be used to prevent frostbite and conserve heat loss.

As Huber notes: “Like your mom said, that’s your chimney; that’s where your heat escapes.”

Top 10 Precautions Against Cold Stress

Allen Abrahamsen, assistant vice president of Construction Safety Services for ESIS Risk Control Services, offers the following 10 precautions outdoor workers should take when exposed to cold weather:

Wearing the proper clothes may be the most significant precaution to reducing cold stress. Workers exposed to cold weather should wear three layers of clothing and protect their heads, hands, and feet.

Drink plenty of fluids, preferably, warm, sweet beverages. Thirst is suppressed in a cold environment and dehydration may occur when fluid intake is reduced.

Increase calorie intake when working in cold environments. Workers in cold environments who wear heavy, protective clothing expend more heat and so require 10 to 15 percent more calories.

A work warm-up schedule should be used to provide periodic times for warm-up breaks. Additional breaks should be provided as the wind velocity increases and/or the temperature drops.

Avoid taking certain drugs such as alcohol, nicotine, caffeine and medication that inhibit the body’s response to cold or impairs judgment.

Avoid the cold if you are becoming exhausted or fatigued. Energy is needed to keep muscles warm.

Shield work areas from drafty or windy conditions. Provide a heated shelter for workers with prolonged exposure to equivalent wind-chill temperatures of 20 degrees above zero or less.

Select the warmest hours of the day when braving the cold. Minimize activities that reduce circulation.

Educate employees on symptoms of cold-related stress, such as heavy shivering, uncomfortable coldness, severe fatigue, drowsiness and/or euphoria.

Use the buddy system. Always work in pairs when working in extreme weather conditions so partners can monitor one another and obtain help quickly in an emergency.