Floods and Personal Protective Equipment

Cold water immersion

Cold water is deadly

Drowning is a major cause of death wherever people must work on or near the water. One of the reasons for these high fatality rates is the cold temperature of our waters. Accident investigations have shown again and again that a person's physical fitness or ability to swim in warm water will not save him or her from drowning in cold water. Hypothermia can be a factor but that takes time - usually more than 30 minutes. The killing factor is often that first shock of cold water on the body.

Cold water is defined as water below 25°C but the greatest effects occur below 15°C. Our waters are usually below 15°C. The effects are so powerful that you may not be able to help yourself. Exposure to cold water changes how your body functions. The first shock takes your breath away. Within a few minutes, your hands are so cold you cannot hold onto anything. You cannot pull yourself out of the water. Swimming becomes difficult or impossible as your breathing and muscles are affected by the cold. Eventually hypothermia sets in. Even if you are rescued, you may still die.

Keep yourself safe by being aware of what could happen to you in cold water. Know what to do to prevent you or other crewmembers from falling into the water and what to do if that occurs.

What happens when you fall into cold water

The effects of cold water on the body may happen in stages: **Cold shock** (stage 1) and **Hypothermia** (stage 2) or **Post-rescue collapse** (stage 3).

If you work on or near lakes, rivers, or the ocean, you could be in danger. Lakes and rivers in B.C. are usually at temperatures similar to the ocean (below 15°C) and may be even colder in winter. Use safe work practices wherever you are.

- Always wear a PFD, life jacket, or immersion suit when working on or near water (wherever there is a risk of drowning).
- Ensure that the equipment used for a specific procedure has been designed to perform that procedure.
- Make sure you have an effective means to call for help when working in remote locations.
- Use fall arrest equipment when working on bridges or over the side of vessels.

1. Cold shock

Cold shock occurs immediately - as you enter the cold water. It lasts three to five minutes but it can result in quick drowning because of the way the body reacts. You cannot control these reactions:

- A large intake of breath
- A rapid increase in breathing rate (up to four times as fast)
- A reduced ability to hold your breath (to as little as 10 seconds)
- A massive increase in heart rate and blood pressure

Drowning may result from cold shock reactions. If your head goes below the surface, you might breathe in water with that first large intake of breath. As little as half a cup of water in your lungs can cause drowning. Problems with breathing can lead to panic, which only reduces your chance of survival.

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You are most likely to survive stage 1 if you:

- Do not inhale water
- Stay afloat
- Keep your head above water

A PFD, life jacket, or immersion suit is essential.

2. Hypothermia

You have probably already heard about the effects of hypothermia. Hypothermia is the cooling of your body's core. It affects your brain, heart, and other internal organs. Your body begins to cool as soon as you enter the water, but the full effect of hypothermia usually takes at least 30 minutes. The effects of hypothermia are:

- A reduction of blood flow to the hands, feet, and surface of the body
- Intense shivering, in the early stages, as the body tries to maintain body core temperature
- Lack of shivering in the later stages
- Loss of consciousness
- Heart failure

The body loses heat four times faster in water than in air. As the body cools, the will to survive decreases. Eventually you lose consciousness and drown, or your heart fails.

3. Post-rescue collapse

The effects on your body after you are pulled from the water can include the following:

- Loss of hydrostatic pressure from the water causes a sudden drop in blood pressure. This can cause heart or brain failure.
- Your heart is cold and cannot pump cold blood effectively to maintain blood pressure.
- Your lungs are damaged from the water you inhaled. This can cause a pneumonia-like illness.
- Fatal bleeding from injuries may occur as your body warms up and your blood flows more freely. You may have internal injuries or injuries to your head and neck that you and your rescuers are not aware of.

People should be recovered from cold water horizontally rather than vertically. Rescue may not mean survival, however. Up to 20 percent of all survivors die during rescue or shortly after.

Wear an immersion suit, PFD, or life jacket

If there is a risk of entering the water, be prepared to stay afloat to survive the effects of cold shock, reduce the need to swim, and give rescuers time to react. Wearing a flotation device can be the difference between living and dying because it can hold your head above water. It also helps to maintain your body temperature. Immersion suits also provide a large, bright target for rescuers to see.