

HEAT STRESS

COURSE OUTLINE

- **When you are working with hazardous materials, personal protective equipment (PPE) can be a double-edged sword.**
 - On the one hand, you couldn't even approach some of these materials safely without wearing PPE.
- **Chemical-protective clothing (CPC), for instance, defends your skin against:**
 - Rashes.
 - Burns.
 - The absorption of toxins.
- **Respiratory gear, such as self-contained breathing apparatuses (SCBAs), guards your airway from gases and vapors.**
- **But with all of the protection that PPE provides, it can also cause problems. This is usually due to two factors:**
 - The weight of PPE.
 - The fact that it can often block air from reaching your skin.
- **An SCBA, for example, can weigh over 30 pounds... and fully-encapsulating CPC adds 30 more pounds to the "load."**
 - Carrying all of that extra weight around will make anyone work up a sweat.
- **This is bad enough under normal conditions, but when your skin is sealed off from the outside air, your sweat cannot evaporate... and you won't be able to cool off.**
 - Under these conditions, your body may overheat, which can cause serious problems... even threaten your life.
 - This is called "heat stress".
- **To help us guard against heat stress, we need to take a close look at:**
 - How it occurs.
 - What its symptoms are.
 - How to beat it.

- **We'll begin by examining how your body's cooling system works under normal conditions.**
 - Most of the time, your body has no problem keeping itself at or near its standard temperature of 98.6 degrees Fahrenheit (37 degrees Celsius).
- **It does this in two ways. The first involves your blood.**
 - Whenever you start to get hot, your body circulates more blood to the outer layers of your skin, where it's easier for the blood to release heat.
 - This is why your skin sometimes feels flushed when you are in a hot place.
 - In essence, your blood works just like the radiator fluid in your car... it comes out of the "engine" hot, gets cooled, and then returns.
- **If blood circulation can't handle the whole job, your body uses a second method to cool you down.**
 - It is at this point that the sweat glands beneath your skin start to secrete "water," through your pores.
 - After a while, the sweat evaporates, lowering your body temperature and making you feel more comfortable.
- **But maintaining your temperature this way can also drain your body's resources.**
 - In addition to the fluids that you lose when you sweat, you also lose valuable minerals that help your body to function properly.
 - If they become too depleted, you can develop rashes, nausea or a high fever.
 - You might pass out... or even die.
- **To understand the roles that fluids and minerals play in keeping you going, let's take a detailed look at how your body uses them.**
 - When you sweat a lot, your body can lose up to one quart of fluid an hour.
 - Over an eight hour day, this adds up to two gallons.
 - If you don't replace this fluid you could end up with a serious case of dehydration.
- **So it's important to replenish what your body sweats away.**
 - Most people drink between five and eight glasses of water a day.
 - In areas of high heat, however, this amount of water won't be nearly enough to protect you from dehydration.

- **This is even more critical if you are at a site that requires the use of totally-encapsulating CPC... because you'll get hot even more quickly than you would under normal conditions.**
 - You won't be able to drink anything while you're doing a job that requires you to wear a respirator or chemical-protective clothing.
 - You can't drink and wear a respirator at the same time.
 - Also, there is simply no place to carry a drink inside of your chemical-protective suit.
- **In these situations, taking a short break every 15 to 20 minutes or so to drink approximately seven ounces of liquid will help you to prevent dehydration.**
 - It will also let you rest and cool down a bit.
- **In addition to the liquid you need to replace, it's also important to replenish the minerals that you sweat away during the day.**
 - These include the electrolytes, such as potassium and phosphate, that your muscles use while they work.
 - When these minerals are depleted, even simple movements can become difficult and painful.
 - Your employer will provide you with beverages whenever you return from decontamination, to restore the fluids and minerals you've lost.
- **We've discussed how your body keeps its temperature under control and learned how dehydration occurs. But what happens when your body's defenses are no longer able to cool you off?**
 - This can result in a condition called "heat stress".
 - This takes many forms, ranging from the mildly painful to life-threatening.
- **Let's look at the different types of heat stress... starting with the least dangerous.**
- **"Heat rash", commonly known as "prickly heat", is an inflammation of the sweat glands... which can occur when they are overworked. symptoms of heat rash include:**
 - Redness of the skin.
 - Prickling or burning sensations.
 - Small blisters (also known as blebs).

- **Although it can be painful, there is no long-term danger to heat rash.**
 - In fact, heat rash serves as a warning sign that worse forms of heat stress might be on their way.
 - If you develop heat rash, you should stop what you are doing and seek medical help as soon as possible.
- **If you ignore heat rash, and do nothing to treat it, you might develop "heat cramps".**
 - Heat cramps are painful spasms in your arms, legs and abdomen.
 - They usually occur when you sweat a lot, but don't replace the minerals that you lose.
 - Heat cramps affect your muscles, but usually don't strike until you've taken a break, or have stopped working for the day.
- **To prevent heat cramps, drink electrolyte-replacing beverages throughout your work shift.**
 - This will quench your thirst, and replace the minerals that you've lost.
- **Whatever you do, don't ignore heat cramps.**
 - They are a strong indicator that you are on your way to developing even more dangerous forms of heat stress.
- **For instance, heat cramps often precede "heat exhaustion", which can cause:**
 - Extreme thirst.
 - Dehydration.
 - Fatigue.
 - Weakness.
 - Loss of coordination.
 - Hyperventilation.
 - Anger.
 - Anxiety.
 - Impaired judgment.
- **As with heat cramps, you can prevent heat exhaustion by drinking electrolyte-replacing fluids throughout the work day.**
 - If you do find yourself suffering from heat exhaustion, stop working and see a doctor immediately!
 - Then follow the doctor's advice as to what activities you can perform at work and at home, and when you can return to your full duties.

- **Anyone who disregards heat rash, heat cramps or heat exhaustion runs a high risk of developing a life-threatening type of heat stress... "heat stroke".**
 - This occurs when your body is no longer capable of cooling itself in any way.
 - If you experience heat stroke, your temperature could rise so high that brain damage or even death could result unless you receive immediate first aid.
- **Symptoms of heat stroke include:**
 - Dizziness.
 - Nausea.
 - Severe headache.
 - Hot, dry skin.
 - Abnormally small pupils.
 - A body temperature of 106 degrees Fahrenheit (41degrees Celsius) or above.
- **Heat stroke is a nightmare no matter where it happens... but workers who develop this condition inside of a contaminated area are in extra danger.**
 - While victims of heat stroke need medical help as soon as possible, they must be decontaminated before they can be treated... no matter how seriously ill they are.
 - No exceptions can be made to this rule.
- **If this is not done, the victims can spread contamination to anyone who touches them... including the doctors and nurses who treat them.**
 - The medical personnel could then unknowingly contaminate other patients.
 - The end result might be hundreds of injuries or deaths, rather than just one.
- **What should you do if one of your coworkers develops heat stress inside of a contaminated area?**
 - First, radio for help at once.
 - Let your supervisor know that a "man-down" situation exists, and call for a stretcher.
 - While the stretcher is being delivered, your supervisor will contact local paramedics.

- **Meanwhile, load the victim onto the stretcher, then get them to the contamination reduction corridor (CRC) as fast, and as safely, as you can.**
 - Once there, the victim and everyone involved in the rescue will be quickly decontaminated.
 - Emergency decontamination procedures will vary from site to site, depending on what type of contaminants are present.
 - Be sure to consult your supervisor about the emergency decontamination procedures at your work site.
- **When decontamination is over, the victim must be moved to an area away from sources of heat and direct sunlight.**
 - Place cool, moist towels on their skin.
 - If possible, place them in a bath of cool... but not cold... water.
 - This is to lower the affected person's temperature gradually, but not shock them by going from one temperature extreme to another.
- **When the ambulance arrives, give the emergency medical technicians a full report of what happened, and let them know what hazardous materials were present where the victim fell.**
 - Your supervisor may also give the ambulance crew SDSs for the substances that the victim was working around.
- **First-aid for heat stroke is easier in uncontaminated areas, where there is no need to send the victim through a CRC. Otherwise, the same basic rules apply:**
 - Call for medical help immediately.
 - Do what you can to cool the victim down while you wait.
- **In most cases, heat stroke is preventable. as with other forms of heat stress, the key is to:**
 - Drink electrolyte-replacing fluids.
 - Take breaks in cool areas to keep from overheating.
- **In addition to proper fluid intake and taking periodic breaks, there are other procedures you can follow to decrease your chances of heat stress.**
 - For example, going through an "acclimatization" process is very important.

- **"Acclimatization" means getting used to wearing your PPE over a gradual period of time.**
 - This will be a part of the hazardous materials training program that your work group participates in.
 - Without acclimatizing, you are more prone to become overheated when you wear your PPE... and that can lead to heat stress.
- **Workers who are not acclimatized also face an increased risk of fainting in warm or humid environments.**
 - This can lead to a fall, which in turn can cause injuries and exposure to hazardous substances.
- **So take a break as soon as you can if you become dizzy or lightheaded.**
 - A rapid heart rate and moist skin can also indicate that you are about to pass out.
 - If you develop any of these symptoms, seek medical attention as soon as possible.
- **Acclimatization deals with what you wear during hazardous materials operations. But sometimes what is inside of you is as important as what is on the outside.**
 - For example, if you're taking medication, it's a good idea to ask your doctor whether any side-effects will occur if you work in high heat areas.
- **Eating wisely is also important.**
 - Hot and heavy meals add heat to your body.
 - They also divert blood to your digestive system that would normally help to cool you off.
 - So, if there is any possibility of you "overheating," eat light, cool meals during the workday.
- **"Light" and "cool" should also describe what you wear next to your skin.**
 - If you know that you are going into a hot situation, you will want to wear loose, lightweight clothing beneath your chemical-protective suit.
 - Cotton is often the fabric of preference.
 - Shirts and pants made of cotton or cotton blends don't trap excess heat as much as some artificial fibers do.
 - Cotton also absorbs sweat, which helps to keep you cool.

- **In some situations, you may want to wear an ice vest, as well.**
 - This fits around your upper torso under your innermost chemical-protective suit, and contains a reusable coolant.
 - After a few hours in a freezer, an ice vest is ready for use.
 - It keeps most of your chest, back and upper abdomen cold, and as a result, you sweat less.
 - This, in turn, lowers your chances of heat stress.
- **There are only two potential drawbacks to using an ice vest.**
 - A vest does add to the weight that you are already carrying.
 - A vest is only a short-term solution to heat problems because the ice in the vest eventually melts.
 - Still, for many hazardous materials operations that involve quick trips into contaminated areas, ice vests can be a useful way to beat the heat.

*** * *SUMMARY* * ***

- **There are a number of ways you can help to prevent heat stress.**
- **Take the time to get properly acclimatized to your personal protective equipment.**
- **Be careful with medications.**
 - Some drugs have side-effects if you use them when the temperature is high.
- **Wear lightweight cotton clothing under your chemical-protective suit.**
 - Cotton stays cool, and also absorbs sweat.
- **Eat light, not hot or heavy meals before working in a high heat area.**
- **Drink lots of water and electrolyte-replacing liquids during your workday.**
- **Take appropriate breaks, to allow your body to recover after you've exerted yourself in a hot environment.**
- **In the world outside of work, "staying cool" means everything from keeping calm to being Ain-the-know."**
 - At a HAZMAT site, however, staying cool can mean the difference between driving your car home at the end of the day... and leaving for the hospital in an ambulance.
- **That's why avoiding heat stress is the "coolest" thing you can do... at work and at home!**