

## **Working in Cold Environments**

### **OVERVIEW**

Employees working in extreme cold weather may be exposed to conditions that can cause frostbite and hypothermia. All department personnel are responsible for protecting employees from cold exposure injuries.

This section describes:

- Extreme cold and normally-expected weather conditions;
- Department, supervisor, and employee responsibilities for providing and using protective outerwear;
- Cold exposure injuries; and
- Frostbite and hypothermia procedures.

### **COLD WEATHER CONDITIONS**

#### **Extreme Cold Weather**

Extreme cold conditions exist when the equivalent chill temperature is at or below -25 degrees Fahrenheit. See chart on 3.42.4.

#### Equivalent Chill Temperature

Equivalent chill temperature is a function of the actual (ambient) temperature and the estimated wind speed. To determine the equivalent chill temperature, refer to the chart on 3.42.4.

Current air temperature and wind speeds can be obtained through TV and radio newcasts and reports, and through WWW weather sites, such as the National Oceanic and Atmospheric Administration at:

[http://weather.noaa.gov/weather/WA\\_cc\\_us.html](http://weather.noaa.gov/weather/WA_cc_us.html)

#### **Normally-Expected Weather**

Normally-expected conditions exist when the equivalent chill temperature is above -25 degrees Fahrenheit. See the chart on 3.42.4.

### **EXTREME COLD WEATHER PROTECTION**

Employees required to work in *extreme cold weather* conditions are to use protective outerwear and work/warm-up schedules to prevent frostbite and hypothermia. See chart on 3.42.4.

Supervisors must consider employee requests to use extreme cold weather protective outerwear regardless of temperature.

3.42.2

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335-3041

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### **Department Responsibilities**

The employing department must provide extreme cold weather protective equipment. Extreme cold weather is defined as an equivalent chill temperature of at or below –25 degrees Fahrenheit (see chart on 3.42.4).

Extreme cold weather protective equipment includes items such as insulated gloves, hats, coveralls, and footwear.

### **Supervisor Responsibilities**

Supervisors are to:

- Determine whether employees will be working in extreme cold weather conditions,
- Ensure that employees are equipped with and wear protective outerwear when necessary,
- Implement work/warm-up schedules when indicated by equivalent chill temperature (see chart on 3.42.4), and
- Consider employee requests to use extreme cold weather protective outerwear regardless of temperature.

### **Employee Responsibilities**

Employees required to work in extreme cold weather conditions are to:

- Wear department-provided protective outerwear, or
- Wear equivalent personal protective outerwear.

## **NORMAL WEATHER APPAREL**

Employees required to work in *normally-expected weather* conditions are to provide and use personal apparel suitable for the conditions.

## **COLD EXPOSURE INJURIES**

### **Frostbite**

Frostbite is caused by the freezing of the fluids around the cells of body tissue. Areas of the body most vulnerable to frostbite are the nose, cheeks, ears, fingers and toes.

### **Initial Symptoms**

Initial symptoms of frostbite usually include:

- An uncomfortable sensation of coldness and pain, followed by
- Numbness.

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### **Additional Symptoms**

Additional symptoms include:

- Tingling, stinging, aching, or cramping pains, which may be felt at first, but then subside;
- Skin changing color to white or grayish-yellow, progressing to reddish-violet, and finally turning black;
- Affected area is cold and numb; and
- Blisters.

### **Hypothermia**

Hypothermia is the lowering of the body's core temperature to abnormal levels.

### **Initial Symptoms**

The initial symptoms of hypothermia usually include:

- Uncontrollable shivering, and
- Sensation of cold.

### **Additional Symptoms**

Additional symptoms include:

- Fits of shivering,
- Vague and slow, slurred speech,
- Memory lapses, and
- Drowsiness.

## **POSSIBLE FROSTBITE OR HYPOTHERMIA**

### **Supervisor Actions**

Upon observing, or being notified of, an employee experiencing the initial symptoms of frostbite or hypothermia, the supervisor is to ensure that the employee is moved to a warm location.

If symptoms worsen or additional symptoms appear, the supervisor is to recommend that the employee seek medical attention.

The supervisor must complete an Incident Report (for Accidental Injury or Work-Related Illness) upon notification of potential frostbite or hypothermia. See 2.24.

### **Employee Actions**

An employee experiencing any of the initial symptoms of frostbite or hypothermia must immediately move to a warm location and notify her or his supervisor.

If the symptoms worsen or additional symptoms appear, the employee should immediately seek medical attention.

### **ASSISTANCE**

Contact Environmental Health and Safety (EH&S) for assistance and information about working in cold environments; telephone 335-3041.

### Equivalent Chill Temperature Chart (Work/Warm-up Schedule for Four-Hour Shifts)

		Actual Temperature Reading (Degrees Fahrenheit)											
		50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
Estimated Wind Speed (in mph)		Equivalent Chill Temperature (Degrees Fahrenheit)											
		<b>Calm</b>	50	40	30	20	10	0	-10	-20	-30	-40	-50
	<b>5</b>	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
	<b>10</b>	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
	<b>15</b>	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
	<b>20</b>	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
	<b>25</b>	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
	<b>30</b>	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
	<b>35</b>	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
	<b>40</b>	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
		<b>PERSONAL APPAREL NEEDED</b>					<b>EXTREME WEATHER CONDITIONS— PROTECTIVE OUTERWEAR REQUIRED</b>						
(wind speeds greater than 40 mph have little additional effect.)		<b>LITTLE DANGER</b> Potential for a false sense of security.					<b>INCREASING DANGER</b> Danger of freezing of exposed flesh within one minute.			<b>GREAT DANGER</b> Flesh may freeze within 30 seconds.			
		<b>Work/Warm-up Schedule for a Four-Hour Shift</b>											
		55 min work		10 min rest	55 min work		10 min rest	55 min work		10 min rest	55 min work		
		30 min work	10 min rest	30 min work	10 min rest	30 min work	10 min rest	30 min work	10 min rest	30 min work	10 min rest	30 min work	
		<b>Non-emergency work should cease</b>											

NOTE: An employee experiencing any of the initial symptoms of frostbite or hypothermia must immediately move to a warm location and notify her or his supervisor.

\*Extrapolated from the ACGIH's Threshold Limit Values and Biological Exposure Indices