

July 19, 1994

HEAT STRESS POSTERS

Information for ordering Heat Stress Posters:

"Heat Stress May Cause Heat Illness"

**American Conference of Governmental Industrial Hygienists, Inc.
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Set of two (2) posters for \$5.00 each set.

Any Questions, please call Darlene x-6181.

Darlene

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Subject _____

**BUSINESS
INFORMATION**

Date _____

DO A 038249
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BUSINESS INFORMATION

Date _____

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HEAT STRESS

THE BODY'S NORMAL RESPONSE TO HEAT

Body Temperature Rises

Blood vessels dilate
More blood flows to skin
Increased heat flow from
center of body to skin

Sweating begins

Convection
Radiation

Evaporation

Reduction in body
Temperature

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HEAT STRESS

TEMPERATURE/RELATIVE HUMIDITY CHART

		AIR TEMPERATURES °F										
		70	75	80	85	90	95	100	105	110	115	120
Relative Humidity		APPARENT TEMPERATURE °F										
0%	64	69	73	78	83	87	91	95	99	103	107	
10%	65	70	75	80	85	90	95	100	105	111	116	
20%	66	72	77	82	87	93	99	105	112	120	130	
30%	67	73	78	84	90	96	104	113	123	135	148	
40%	68	74	79	86	93	101	110	123	137	151		
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80%	71	78	86	97	113	136						
90%	71	79	88	102	122							
100%	72	80	91	108								

Source: The National Weather Service, Alvin, Texas

HEAT STRESS

TEMPERATURE/RELATIVE HUMIDITY CHART

Relative Humidity	AIR TEMPERATURES °F										
	70	75	80	85	90	95	100	105	110	115	120
APPARENT TEMPERATURE °F											
0%	64	69	73	78	83	87	91	95	99	103	107
10%	65	70	75	80	85	90	95	100	105	111	116
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Source: The National Weather Service, Alvin, Texas

II. B. 1/93

This chart shows how a combination of heat and humidity can produce apparent temperatures as much as 15 to 30 degrees higher than the actual mercury readings.

The apparent temperature appears in the square where the air temperature column and the humidity line meet.

The readings within the bold box make up the "danger zone" where heat stroke or collapse are more likely to occur.

The heat stress index may go off the scale when the sun comes out immediately after a summer thunderstorm and standing water is quickly evaporating.

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HEAT STRESS

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FACTORS CONTRIBUTING TO HEAT STRESS



Age



Chronic or Recent Illness



Prolonged Exertion



Lack of Acclimation



Poor Physical Condition



Use of Certain Prescription Drugs



Recent Overindulgence in Alcohol



Previous Heat Stroke

HEAT STRESS

FACTORS CONTRIBUTING TO HEAT STRESS

-  **Age**
-  **Chronic or Recent Illness**
-  **Prolonged Exertion**
-  **Lack of Acclimation**
-  **Poor Physical Condition**
-  **Use of Certain Prescription Drugs**
-  **Recent Overindulgence in Alcohol**
-  **Previous Heat Stroke**

II. C. 1/93

Age - infants and elderly persons are at particularly high risk

Chronic illness or a recent illness (especially illness causing dehydration such as diarrhea and/or vomiting), mental illness or depression

Prolonged exertion under heat stress with inadequate time allowed for rest and fluid replacement

Obesity

The use of major tranquilizers, diuretics, and other drugs that may impair the ability to sweat or to regulate body heat

Previous heat stroke or severe heat exhaustion- an individual once affected should be exposed to subsequent

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HEAT STRESS

ACCLIMATION SCHEDULE

<u>Number of Days On the Job</u>	<u>Recommended Heat Exposure % of Normal Daily Exposure</u>
1	50
2	60
3	70
4	80
5	90
6	100

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HEAT STRESS**ACCLIMATION SCHEDULE**

<u>Number of Days On the Job</u>	<u>Recommended Heat Exposure % of Normal Daily Exposure</u>
1	50
2	60
3	70
4	80
5	90
6	100

II. J. 1/93

This chart represents a recommended schedule for introducing new non-acclimated workers to hot work areas.

Introduce new workers to heat exposure gradually.

Allow employees to adequately acclimate themselves to the heat following illness, vacation or absence from work of two weeks or longer.

Acclimation increases the heat tolerance while decreasing the risk of heat illness.

An acclimated worker can sweat more and have less increase in pulse rate and body temperature than the non-acclimated worker.

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HEAT STRESS

HEAT STRESS PREVENTION IMPERMEABLE CLOTHING WORK/REST SCHEDULE

Temperature (degrees F)	Maximum Stay Time (minutes)	Minimum Rest Time* (minutes)
72-79	40	20
80-87	30	30
88-?	20	40

*Rest in a cool location with adequate air movement provided by fans and/or air conditioners.

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HEAT STRESS**HEAT STRESS PREVENTION
IMPERMEABLE CLOTHING WORK/REST SCHEDULE**

<u>Temperature (degrees F)</u>	<u>Maximum Stay Time (minutes)</u>	<u>Minimum Rest Time*</u> <u>(minutes)</u>
72-79	40	20
80-87	30	30
88-7	20	40

*Rest in a cool location with adequate air movement provided by fans and/or air conditioners.

II. K. 1/93

This chart gives a work/rest schedule for preventing heat stress while working in impermeable clothing.

It is based on the ambient air temperature.

Metabolism is the major source of heat load when working in impermeable clothing such as chemical protective clothing. The clothing severely limits sweat evaporation.

The following work practices are recommended to prevent heat stress while working in impermeable clothing.

- Fluid Replacement - one quart prior to beginning of work and one quart each hour after that.
- Self-paced work - workers must adjust the pattern of work to avoid over exposure. Exposure must be terminated with onset of symptoms of heat stress.
- Scheduling - perform work, if possible, during cooler hours and share work loads with additional persons
- Acclimation - following illness, vacation, or absence from work of two weeks or longer, follow approved acclimation schedule based on a five-day period.
- Cool Vests - to be worn under the impermeable clothing.

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HEAT ILLNESS

- ✓ Heat Rash
- ✓ Heat Cramps
- ✓ Heat Exhaustion
- ✓ Heat Stroke

HEAT STRESS

HEAT ILLNESS

- ✓ Heat Rash
- ✓ Heat Cramps
- ✓ Heat Exhaustion
- ✓ Heat Stroke

II. D. 1/93

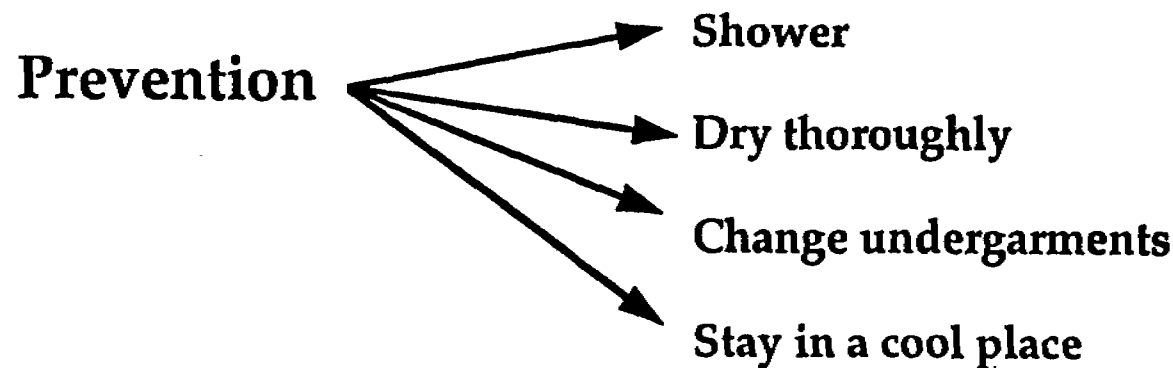
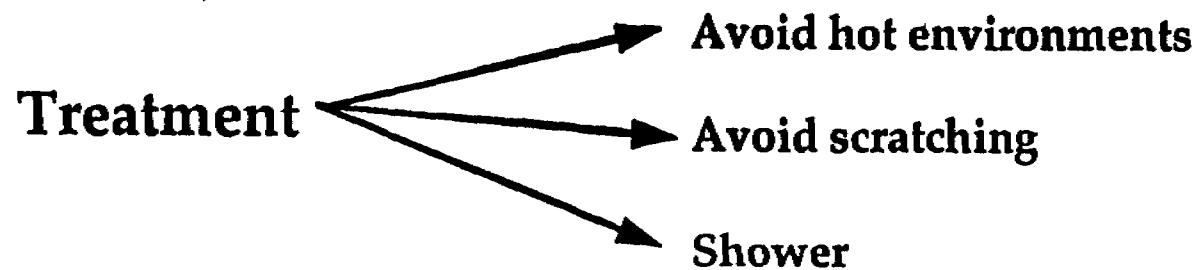
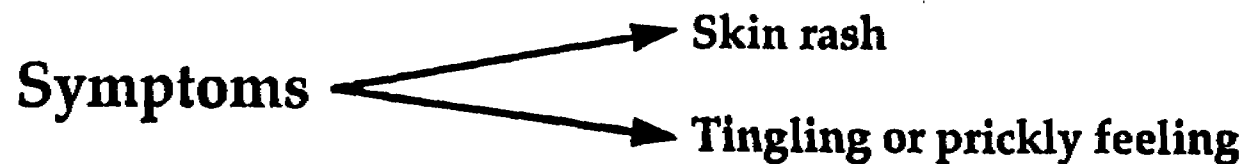
Whenever the normal cooling actions do not occur a heat illness may result.

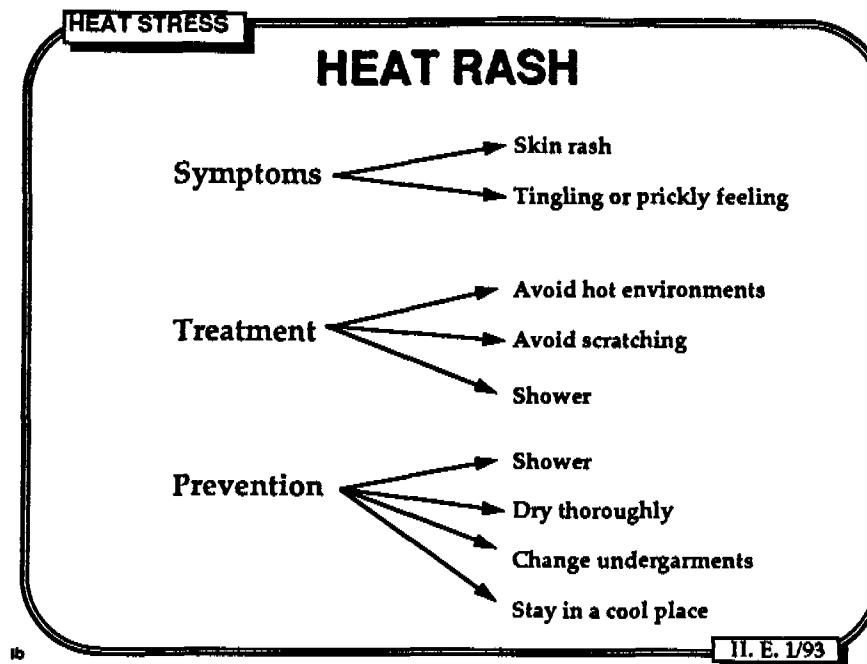
Typical heat disorders include heat rash (prickly heat), heat cramps, heat exhaustion, and heat stroke.

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HEAT RASH

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Heat rash also called Prickly Heat

Symptoms - skin rash over the arms, shoulders, chest, and behind the knees accompanied by tingling or prickly feeling on the skin

Treatment - avoid hot environments and sunshine, avoid scratching, and take a shower after each activity that produces sweat

Prevention - after working in a hot environment, take a shower, dry the skin thoroughly, change undergarments, and stay in a cool place after work

See your physician

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HEAT CRAMPS

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Symptoms

- Sudden onset of cramps
- Muscles are painful and "knotted"
- Usually involves muscles doing work

Treatment

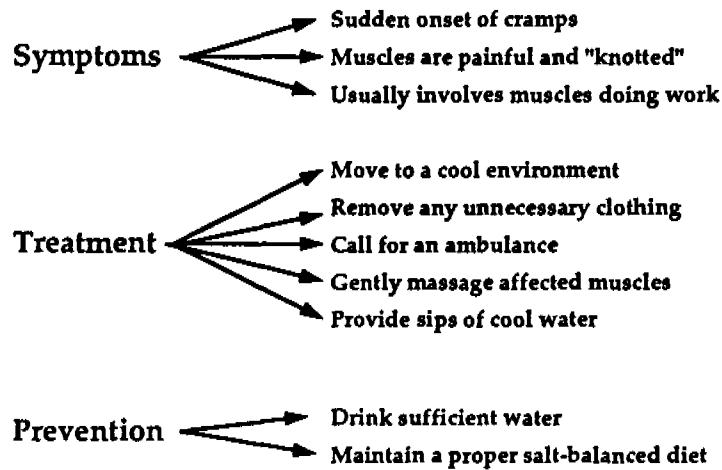
- Move to a cool environment
- Remove any unnecessary clothing
- Call for an ambulance
- Gently massage affected muscles
- Provide sips of cool water

Prevention

- Drink sufficient water
- Maintain a proper salt-balanced diet

HEAT STRESS

HEAT CRAMPS



II. F. 1/93

Symptoms include a sudden onset of cramps of the skeletal or abdominal muscles.

Usually not serious or long-lasting, but cause serious pain.

If the abdominal muscles are involved, the attack may resemble appendicitis.

Usually the muscles involved are those used in performing the job, such as the muscles of the arms and legs.

Cramps are sometimes seen in individuals who are otherwise healthy and in good condition.

Heat cramps can occur when the temperature is not unusually hot or when the sun is not unusually bright.

May occur during or after work

The cause is not fully understood.

Taking salt will not alleviate heat cramps and can actually be harmful.

DO NOT TAKE SALT TABLETS!

Rest, water and the opportunity to cool are necessary to alleviate the cramps.

An employee with abdominal cramps may not be able to tolerate water so do not delay transport to a medical facility where additional treatment can be administered.

Drink sufficient water starting at the beginning of the shift and continue throughout the shift.

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HEAT EXHAUSTION

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Symptoms

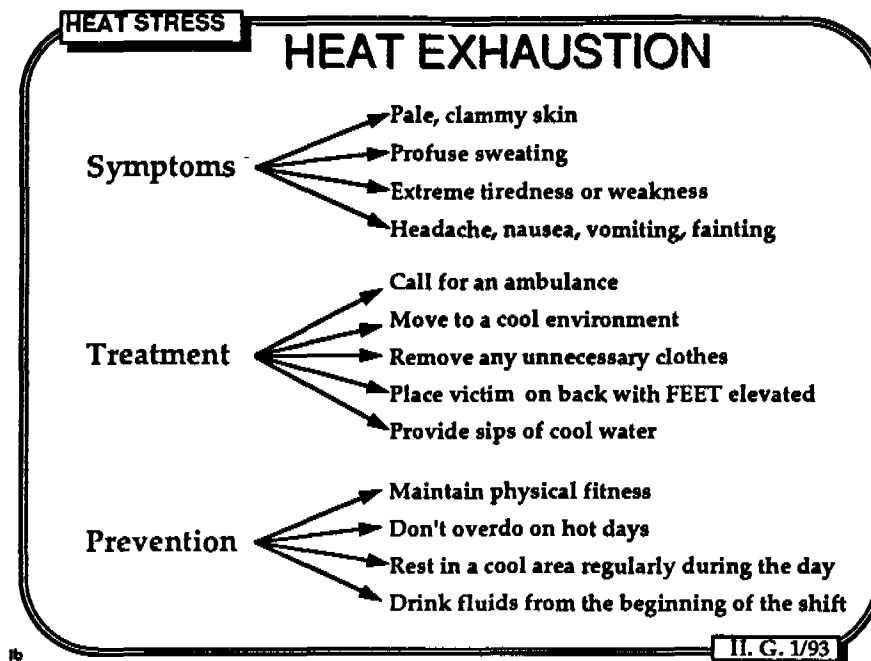
- Pale, clammy skin
- Profuse sweating
- Extreme tiredness or weakness
- Headache, nausea, vomiting, fainting

Treatment

- Call for an ambulance
- Move to a cool environment
- Remove any unnecessary clothes
- Place victim on back with FEET elevated
- Provide sips of cool water

Prevention

- Maintain physical fitness
- Don't overdo on hot days
- Rest in a cool area regularly during the day
- Drink fluids from the beginning of the shift



The major signs of heat exhaustion are pale, clammy skin, profuse sweating, and extreme tiredness or weakness.

The victim may have headache, nausea, vomiting, and/or loss of appetite.

The victim may faint.

An individual with any signs or symptoms of heat exhaustion should be treated as for mild shock.

Care should be immediate.

While someone is calling for the ambulance, move the employee to a cool environment.

If the person is conscious, offer small amounts of cool water to drink.

Do not delay prompt transport to a medical facility.

Maintain proper cardiovascular fitness through proper exercise and diet.

Remember, thirst is not an adequate stimulus to maintain sufficient fluid in the body.

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HEAT STROKE

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Symptoms

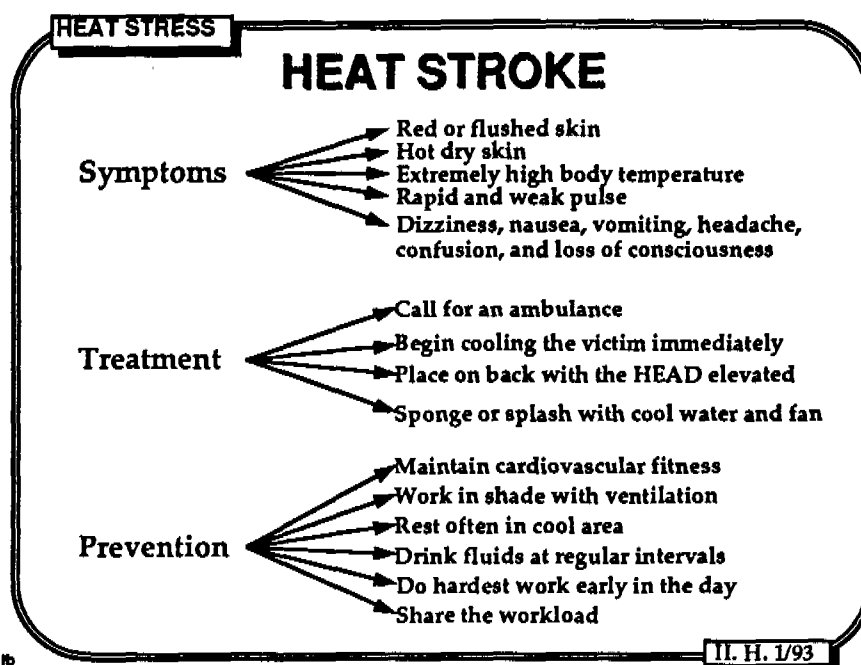
- Red or flushed skin
- Hot dry skin
- Extremely high body temperature
- Rapid and weak pulse
- Dizziness, nausea, vomiting, headache, confusion, and loss of consciousness

Treatment

- Call for an ambulance
- Begin cooling the victim immediately
- Place on back with the HEAD elevated
- Sponge or splash with cool water and fan

Prevention

- Maintain cardiovascular fitness
- Work in shade with ventilation
- Rest often in cool area
- Drink fluids at regular intervals
- Do hardest work early in the day
- Share the workload



SYMPTOMS:

- Heat stroke is the least common but the most serious form of heat stress.
- It occurs when heat exposure overwhelms the body's mechanisms for dissipating excess heat.
- Sweating, a major mechanism for heat loss, ceases.
- Heat continues to build up in the body to the point where body cells, particularly those in the brain, can be permanently damaged.
- There is usually a history of prolonged exposure to heat, particularly in a humid environment.
- There is a sudden onset of symptoms (hot, dry skin although a person may have been sweating profusely earlier).
- Body temperature of 106°F.
- There may be convulsions and/or muscle twitching.

TREATMENT:

- Heat stroke is a true LIFE-THREATENING EMERGENCY!
- The body temperature rises so high so rapidly that brain damage and death will result if cooling doesn't take place quickly.
- Call for an ambulance immediately when heat stroke is suspected.
- Begin cooling victim by splashing or sponging with cool water and fanning while waiting for the ambulance
- Transport to a medical facility as quickly as possible.
- Do not give anything by mouth to an unconscious person.
- Do not give the victim stimulants such as coffee, tea, or cola beverages.
- Recognition and early treatment can prevent permanent brain damage and death.

PREVENTION:

- Maintain cardiovascular fitness through proper exercise and diet.
- Work in shady areas, if possible, with plenty of ventilation.
- Drink fluids at regular intervals, such as every 20 minutes, starting at the beginning of the shift.
- Share the work load with another worker when possible
- If possible, do the hardest work early in the day when it is cooler

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HEAT STRESS

THE BODY'S NORMAL RESPONSE TO HEAT

Body Temperature Rises

Blood vessels dilate
More blood flows to skin
Increased heat flow from
center of body to skin

Sweating begins

Convection
Radiation

Evaporation

Reduction in body
temperature

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HEAT STRESS

TEMPERATURE/RELATIVE HUMIDITY CHART

		AIR TEMPERATURES °F										
		70	75	80	85	90	95	100	105	110	115	120
Relative Humidity		APPARENT TEMPERATURE °F										
0%	64	69	73	78	83	87	91	95	99	103	107	
10%	65	70	75	80	85	90	95	100	105	111	116	
20%	66	72	77	82	87	93	99	105	112	120	130	
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40%	68	74	79	86	93	101	110	123	137	151		
50%	69	75	81	88	96	107	120	135	150			
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80%	71	78	86	97	113	136						
90%	71	79	88	102	122							
100%	72	80	91	108								

Source: The National Weather Service, Alvin, Texas

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HEAT STRESS

PERMISSIBLE HEAT EXPOSURE TLVs

Wet Bulb Globe Temperature (Degrees Fahrenheit)

<u>WORK/REST</u>	<u>LIGHT WORK</u>	<u>MODERATE WORK</u>	<u>HEAVY WORK</u>
Continuous work	86	80	77
Work 75%/Rest 25%	87	82	78
Work 50%/Rest 50%	89	85	82
Work 25%/Rest 75%	90	88	86

Light Work (up to 200 KCAL/HR): Sitting or standing to control machines, performing light hand or arm work.

Moderate Work (200-350 KCAL/HR): Walking about with moderate lifting and pushing.

Heavy Work (350-500 KCAL/HR): Pick and shovel work.

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HEAT STRESS

ACCLIMATION SCHEDULE

**Number of Days
On the Job**

**Recommended Heat Exposure
% of Normal Daily Exposure**

1

50

2

60

3

70

4

80

5

90

6

100

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HEAT STRESS

Heat Stress Prevention Impermeable Clothing Work/Rest Schedule

<u>Temperature (degrees F)</u>	<u>Maximum Stay Time (minutes)</u>	<u>Minimum Rest Time* (minutes)</u>
72 - 79	40	20
80 - 87	30	30
88 - ?	20	40

*Rest in a cool location with adequate air movement provided by fans and/or air conditioners.

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Heat Index Table

Environmental Temperature (°F)

Relative % Humidity	70	75	80	85	90	95	100	105	110	115	120
	Apparent Temperature *										
0	64	69	73	78	83	87	91	95	99	103	107
10	65	70	75	80	85	90	95	100	105	111	116
20	66	72	77	82	87	93	99	105	112	120	130
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80	71	78	86	97	113	136					
90	71	79	88	102	122						
100	72	80	91	108							

* Combined index of heat and humidity = what it "feels like" to the body.

How to Use the Heat Index Table

1. Locate the Env. Temp. across the top row.
2. Locate the Rel. % Humidity down the left side.
3. Follow across and down to find the Apparent Temp.
4. Determine the Heat Stress Risk on the chart at the right.

Apparent Temperature

95 -105

105 - 130

131 and >

Heat Stress Risk with Physical Activity and/or Prolonged Exposure

Heat cramps or heat exhaustion possible

Heat cramps or heat exhaustion likely,
Heatstroke Possible

Heatstroke highly likely

NOTE: This Heat Index chart is designed to provide general guidelines for accessing the potential severity of heat stress. Individual reactions to heat will vary. In addition, studies indicate that susceptibility to heat disorders tends to increase with age.

NOTE: Exposure to full sunshine can increase Heat Index values by up to 15 degrees (F).

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