Office of Fire Prevention and Control

Safety Alert Bulletin

1 August 2006

Hot Weather Firefighting...and Firefighting REHAB!

It's summertime, and the living is EASY!!...until your tones go off! Then, it becomes an issue of firefighting in the hot weather! And while some areas have this to deal with all year long, many don't!

When challenged with this situation, remember the LIFE SAVING TACTIC of firefighter REHAB! Once firefighters rotate out of the firefighting mode, they must head to REHAB so they can be ready to get back into the "working" mode when needed. But keep in mind that rehab is a critical process, so much more than a candy bar and a bottle of water. Fortunately, the U.S. Fire Administration has done a great job outlining the proper rehab procedure.

A copy of the original USFA Emergency Incident Rehabilitation manual may be viewed and downloaded from the following page of the USFA Web site:

http;//www.usfa.fema.gov/downloads/pdf/publications/FA-114.pdf

Furthermore, there is an excellent piece on FIREFIGHTER REHAB at:

http://www.firefighterclosecalls.com/downloads/FireEngineeringArticleinPrint.pdf

as well as a FREE PowerPoint program at:

http://www.firefighterclosecalls.com/downloads.php

Excessive Heat Events Guidebook

The U.S. Environmental Protection Agency has produced the Excessive Heat Events Guidebook with assistance from Federal, state and local and academic partners.

Designed to help community officials, emergency managers, meteorologists, and others plan for and respond to excessive heat events, the guidebook highlights best practices that have been employed to save lives during excessive heat events in different urban areas and provides a menu of options that officials can use to respond to these events in their communities.

http://epa.gov/heatisland/about/heatguidebook.html

More Links to Information on Heat Stress:

Athletic Trainers Tell How to Avoid Heat Illnesses:

http://www.nlm.nih.gov/medlineplus/news/fullstory_36408.html

Many Don't Heed Heat Advisories:

http://www.nlm.nih.gov/medlineplus/news/fullstory_36391.html

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Heat Index Charts

To use the heat index charts, find the appropriate temperature at the top of the chart. There are two charts on this page. Read down until you are opposite the humidity/dewpoint. The number which appears at the intersection of the temperature and humidity/dewpoint is the heat index.

Heat Index Chart (Temperature & Dewpoint)

Dewpoint (° F)	Temperature (° F)															
	90	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**	**101**	**102**	**103**	**104**	**105**
65	94	95	96	97	98	100	101	102	103	104	106	107	108	109	110	112
66	94	95	97	98	99	100	101	103	104	105	106	108	109	110	111	112
67	95	96	97	98	100	101	102	103	105	106	107	108	110	111	112	113
68	95	97	98	99	100	102	103	104	105	107	108	109	110	112	113	114
69	96	97	99	100	101	103	104	105	106	108	109	110	111	113	114	115
70	97	98	99	101	102	103	105	106	107	109	110	111	112	114	115	116
71	98	99	100	102	103	104	106	107	108	109	111	112	113	115	116	117
72	98	100	101	103	104	105	107	108	109	111	112	113	114	116	117	118
73	99	101	102	103	105	106	108	109	110	112	113	114	116	117	118	119
74	100	102	103	104	106	107	109	110	111	113	114	115	117	118	119	121
75	101	103	104	106	107	108	110	111	113	114	115	117	118	119	121	122
76	102	104	105	107	108	110	111	112	114	115	117	118	119	121	122	123
77	103	105	106	108	109	111	112	114	115	117	118	119	121	122	124	125
78	105	106	108	109	111	112	114	115	117	118	119	121	122	124	125	126
79	106	107	109	111	112	114	115	117	118	120	121	122	124	125	127	128
80	107	109	110	112	114	115	117	118	120	121	123	124	126	127	128	130
81	109	110	112	114	115	117	118	120	121	123	124	126	127	129	130	132
82	110	112	114	115	117	118	120	122	123	125	126	128	129	131	132	133

Note: *Exposure to full sunshine can increase HI values by up to 15° F*

Heat Index Chart (Temperature & Relative Humidity)																
RH (%)	**Temperature (° F)**															
	90	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**	**101**	**102**	**103**	**104**	**105**
90	119	123	128	132	137	141	146	152	157	163	168	174	180	186	193	199
85	115	119	123	127	132	136	141	145	150	155	161	166	172	178	184	190
80	112	115	119	123	127	131	135	140	144	149	154	159	164	169	175	180
75	109	112	115	119	122	126	130	134	138	143	147	152	156	161	166	171
70	106	109	112	115	118	122	125	129	133	137	141	145	149	154	158	163
65	103	106	108	111	114	117	121	124	127	131	135	139	143	147	151	155
60	100	103	105	108	111	114	116	120	123	126	129	133	136	140	144	148
55	98	100	103	105	107	110	113	115	118	121	124	127	131	134	137	141
50	96	98	100	102	104	107	109	112	114	117	119	122	125	128	131	135
45	94	96	98	100	102	104	106	108	110	113	115	118	120	123	126	129
40	92	94	96	97	99	101	103	105	107	109	111	113	116	118	121	123
35	91	92	94	95	97	98	100	102	104	106	107	109	112	114	116	118
30	89	90	92	93	95	96	98	99	101	102	104	106	108	110	112	114
***Note:** Exposure to full sunshine can increase HI values by up to 15° F*																

For the more ambitious who would like to calculate the heat index, here is the formula:

$$\begin{aligned} HI = {} & 16.923 + (1.85212 \times 10^{-1} * T) + (5.37941 * RH) - (1.00254 \times 10^{-1} * T * RH) \\ & + (9.41695 \times 10^{-3} * T^2) + (7.28898 \times 10^{-3} * RH^2) + (3.45372 \times 10^{-4} * T^2 * RH) \\ & - (8.14971 \times 10^{-4} * T * RH^2) + (1.02102 \times 10^{-5} * T^2 * RH^2) - (3.8646 \times 10^{-5} * T^3) \\ & + (2.91583 \times 10^{-5} * RH^3) + (1.42721 \times 10^{-6} * T^3 * RH) + (1.97483 \times 10^{-7} * T * RH^3) \\ & - (2.18429 \times 10^{-8} * T^3 * RH^2) + (8.43296 \times 10^{-10} * T^2 * RH^3) - (4.81975 \times 10^{-11} * T^3 * RH^3) \end{aligned}$$

OSHA FactSheet

Protecting Workers from Effects of Heat

During emergency response activities or recovery operations, workers may be required to work in hot environments, and sometimes for extended periods. When the body is unable to cool itself by sweating, several heat-induced illnesses can occur, and can result in death. The following information will help workers understand what heat stress is, how it may affect their health and safety, and how it can be prevented.

Factors Leading to Heat Stress

- High temperature and humidity; direct sun or heat; limited air movement; physical exertion; poor physical condition; some medicines; inadequate tolerance for hot workplaces; and insufficient water intake can all lead to heat stress.

What kind of heat disorders and health effects are possible and how should they be treated?

- **Heat Stroke** is the most serious heat related disorder and occurs when the body's temperature regulation fails and body temperature rises to critical levels. It is a medical emergency that may result in death. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature. If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. Until professional medical treatment is available, the worker should be placed in a shady, cool area and the outer clothing should be removed. Douse the worker with cool water and circulate air to improve evaporative cooling. Provide the worker fluids (preferably water) as soon as possible.

- **Heat Exhaustion** is only partly due to exhaustion; it is a result of the combination of excessive heat and dehydration. Signs and symptoms are headache, nausea, dizziness, weakness, thirst, and giddiness. Fainting or heat collapse is often associated with heat exhaustion. Workers suffering from heat exhaustion should be removed from the hot environment and given fluid replacement. They should also be encouraged to get adequate rest, and when possible, ice packs should be applied.

- **Heat Cramps** are usually caused by performing hard physical labor in a hot environment. Heat cramps have been attributed to an electrolyte imbalance caused by sweating and are normally caused by the lack of water replenishment. It is imperative that workers in hot environments drink water every 15 to 20 minutes and also drink carbohydrate-electrolyte replacement liquids (e.g., sports drinks) to help minimize physiological disturbances during recovery.

- **Heat Rashes** are the most common problem in hot work environments where the skin is persistently wetted by unevaporated sweat. Heat rash looks like a red cluster of pimples or small blisters. It is more likely to occur on the neck and upper chest, in the groin, under the breasts, and in elbow creases. The best treatment for heat rash is to provide a cooler, less humid environment. Keep the affected area dry. Dusting powder may be used to increase comfort, but avoid using ointments or creams—they keep the skin warm and moist and may make the condition worse.

Administrative or work practice controls to offset heat effects

- **Acclimatize workers** by exposing them to work in a hot environment for progressively longer periods.

- **Replace fluids** by providing cool water or any cool liquid (except alcoholic and caffeinated beverages) to workers and encourage them to

drink small amounts frequently, e.g., one cup every 20 minutes. Ample supplies of liquids should be placed close to the work area.

- **Reduce the physical demands** by reducing physical exertion such as excessive lifting, climbing, or digging with heavy objects. Use relief workers or assign extra workers, and minimize overexertion.
- **Provide recovery areas** such as air-conditioned enclosures and rooms and provide intermittent rest periods with water breaks.
- **Reschedule hot jobs** for the cooler part of the day, and routine maintenance and repair work in hot areas should be scheduled for the cooler seasons of the year.
- **Monitor workers** who are at risk of heat stress, such as those wearing semi-permeable or impermeable clothing when the temperature exceeds 70°F, while working at high energy levels. Personal monitoring can be done by checking the heart rate, recovery heart rate, and oral temperature.

What Personal Protective Equipment is effective in minimizing heat stress?

- **Reflective clothing**, worn as loosely as possible, can minimize heat stress hazards.
- **Wetted clothing**, such as terry cloth coveralls or two-piece, whole-body cotton suits are another simple and inexpensive personal cooling technique. It is effective when reflective or other impermeable protective clothing is worn.
- **Water-cooled garments** range from a hood, which cools only the head, to vests and "long johns," which offer partial or complete body cooling. Use of this equipment requires a battery-driven circulating pump, liquid-ice coolant, and a container.

Additional Information

- For more information on this, and other health-related issues affecting workers, visit OSHA's Web site at www.osha.gov.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

For more complete information:

OSHA Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov

(800) 321-OSHA

DSTM 9/2005

Tips for Preventing Heat-Related Illness

The best defense is prevention. Here are some prevention tips:

- Drink more fluids (nonalcoholic), regardless of your activity level. Don't wait until you're thirsty to drink. Warning: If your doctor generally limits the amount of fluid you drink or has you on water pills, ask him how much you should drink while the weather is hot.
- Don't drink liquids that contain caffeine, alcohol, or large amounts of sugar–these actually cause you to lose more body fluid. Also, avoid very cold drinks, because they can cause stomach cramps.
- Stay indoors and, if at all possible, stay in an air-conditioned place. If your home does not have air conditioning, go to the shopping mall or public library–even a few hours spent in air conditioning can help your body stay cooler when you go back into the heat. Call your local health department to see if there are any heat-relief shelters in your area.
- Electric fans may provide comfort, but when the temperature is in the high 90s, fans will not prevent heat-related illness. Taking a cool shower or bath, or moving to an air-conditioned place is a much better way to cool off.
- Wear lightweight, light-colored, loose-fitting clothing.
- NEVER leave anyone in a closed, parked vehicle.
- Although any one at any time can suffer from heat-related illness, some people are at greater risk than others. Check regularly on:
    - Infants and young children
    - People aged 65 or older
    - People who have a mental illness
    - Those who are physically ill, especially with heart disease or high blood pressure
- Visit adults at risk at least twice a day and closely watch them for signs of heat exhaustion or heat stroke. Infants and young children, of course, need much more frequent watching.

If you must be out in the heat:

- Limit your outdoor activity to morning and evening hours.
- Cut down on exercise. If you must exercise, drink two to four glasses of cool, nonalcoholic fluids each hour. A sports beverage can replace the salt and minerals you lose in sweat. Warning: If you are on a low-salt diet, talk with your doctor before drinking a sports beverage. Remember the warning in the first "tip" (above), too.
- Try to rest often in shady areas.
- Protect yourself from the sun by wearing a wide-brimmed hat (also keeps you cooler) and sunglasses and by putting on sunscreen of SPF 15 or higher (the most effective products say "broad spectrum" or "UVA/UVB protection" on their labels).

This information provided by NCEH's Health Studies Branch (www.cdc.gov/nceh/hsb).

For more information, visit www.bt.cdc.gov/disasters/extremeheat, or call the CDC public response hotline at (888) 246-2675 (English), (888) 246-2857 (español), or (866) 874-2646 (TTY).

DEPARTMENT OF HEALTH AND HUMAN SERVICES
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