Workplace Heat Kills and Causes Injury

Are high temperatures in your workplace involved in any of the following situations?

- Buildings with inadequate cooling capacity
- Inadequate ventilation of boilers, furnaces or other hot production equipment
- Outdoor work in hot environments without cooling protections
- The use of Personal Protective Clothing [PPE] or equipment that contribute to worker heat stress loads.
- Increased risk for heat related illness and injury from mandatory work shifts/overtime.
- The lack of a formal program to educate, acclimatize and protect workers regarding the dangers of heat related work hazards

What are the Health and Safety Hazards of Workplace Heat Exposure?

Heat Stroke
Heat stroke is the most serious of heat related health problems. It can occur when the body stops adjusting to the hot temperature by sweating, and can’t keep up with the heat. Characterized by hot, dry, red skin that is warm or hot to the touch, medical attention is needed immediately!
Heat Exhaustion
Heat exhaustion is caused by the loss of large amounts of fluid from the body. A worker with heat exhaustion continues to sweat, but their body can’t keep up with the heat. The worker may have a headache, fatigue, or flu like symptoms. In most cases the worker needs to rest, cool down, and drink plenty of liquids.

Heat Cramps
Workers may suffer from cramps and painful muscle spasms. This is typically a result when workers drink water to replace the fluids they lose from sweating, but don’t replace the body’s loss of salt. Drinking fluids with electrolyte replacement ingredients are recommended.

Heat Syncope
Heat syncope is a fainting episode or dizziness that usually occurs with prolonged standing or sudden rising from a sitting or lying position. Factors that may contribute to heat syncope include dehydration and lack of acclimatization.

Heat Rash
Heat rash is a skin irritation caused by excessive sweating during hot, humid weather.

Neurological Effects
The heat also may lower mental alertness and ability to work. Workers in extreme environments may make more mistakes and may have more injuries.

Contributing Causes
Heat can increase your risk of suffering from other illnesses and health problems.

Heat increases risks of serious illness and injury, making work more stressful and dangerous.

Heat exposure is a dangerous health hazard but it is also an important “working condition” that needs to be addressed by management to provide an adequate and safe environment for all workers.
CONTROLLING HEAT EXPOSURE
Heat should be controlled through workplace changes ("engineering controls") such as the following:

- **Fans and Ventilation** increase air circulation and evaporation of sweat but are only effective if the air temperature is below 98 degrees F.
- **Shields or insulation** can isolate hot operations from other parts of the workplace.
- **Air conditioners** in cabs, booths, rest areas, or lunchrooms help cool down the body.
- **Local ventilation** can draw heat or steam away from the work area.

Organizational - Examples of USW Negotiated Heat Relief Programs—

- Air-conditioned break areas provided throughout hot work areas.
- Cool water and sports drinks are provided.
- Portable cooling devices in work areas.
- Air-conditioned control rooms provide opportunity workers to cool down.
- Employers follow heat stress and exposure guidelines.
- Workers in high heat work areas rotate work environments.
- Work shifts are adjusted to get the hottest [or coldest] part of the job done to reduce temperature extremes.
- Personal protective equipment is provided and paid for to protect workers from heat [or cold].
- Time is provided for workers to adjust to the hot work environment. [Acclimatization Plan]
- Workers are trained about heat and its effects.
KEEPING COOL
There are proven ways to remove or reduce heat from the workplace. The union negotiates with employers to implement the design and install equipment to accomplish this. When heat cannot be eliminated, the union works with its membership to provide relief from heat. Some examples of this are listed below:

**Adjustment periods** of a week or more should be provided when the first hot spells hit, when a new worker is hired, or when someone returns from vacation.

**Heat breaks** or slowing down the pace of work should be allowed, especially if the worker feels even slight heat strain.

**Rest areas** should be cool and located near the workplace.

**Body Cooling Vest**

*Shaded Areas Reduce Radiant Heat*

**Cool water** should be easily available. In really hot conditions, workers should drink at least a cup every 15-20 minutes.

**Different schedules may** be negotiated to let workers do the hardest work during the coolest parts of the day.

**Educate** workers about the dangers from excessive heat and humidity and the procedures to provide protection.

**Seek work/rest schedules** to avoid work during high/extremely hot temperatures. Where this is not possible, a two-person crew should be assigned to perform work during extremely hot temperatures.

Ensure workers are provided **chilled/ice water with electrolyte supplements** and access to these fluids during work.
Provide **sun-shielding devices and screens**, light-colored and lightweight clothing for outdoor workers.

**Personal –**

- Know the factors that increase one’s risk for heat related disorders. Be aware if you or co-workers are experiencing any of the signs of being affected by heat or cold stress.

**Heat Stress Prevention Programs**

It’s not enough for employers to tell workers that they should “take a break” when they are at risk for heat stress. There are no formal OSHA standards that specifically address heat. Hazardous exposure to heat could come under the **OSHA General Duty clause** of the OSHA Act. There are important recommendations to protect workers on the OSHA website.

**Elements of a Heat Stress Program**

- Heat reduction
- Administrative controls
- Personal protective equipment (PPE)
- Information and training
- Hygiene practices
- Medical surveillance
- Acclimatization

**ACCLIMATIZATION Programs** – The body learns to adapt

The human body can adapt to heat exposure to some extent. This physiological adaptation is called acclimatization. After a period of acclimatization, the same activity will produce fewer cardiovascular demands. The worker will sweat more efficiently (causing better evaporative cooling), and thus will more easily be able to maintain normal body temperatures.
Worker struggles in hot environment

A properly designed and applied acclimatization program decreases the risk of heat-related illnesses. Such a program basically involves exposing employees to work in a hot environment for progressively longer periods.

NIOSH [National Institute of Occupational Safety and Health] says that, for workers who have had previous experience in jobs where heat levels are high enough to produce heat stress, the regimen should be 50% exposure on day one, 60% on day two, 80% on day three, and 100% on day four. For new workers who will be similarly exposed, the regimen should be 20% on day one, with a 20% increase in exposure each additional day.

ACGIH [American Conference of Governmental Industrial Hygienist] Recommendation for Heat Exposure
OSHA cites this standard as a basis for compliance with hot environments. This standard recommends significant rest periods [15 minutes break for every 45 minutes of work] for the temperatures above the following – 87°F [Light work], 82°F [Moderate] and 78°F [Heavy]. Temperatures are measured with WBGT meter and are an average over an 8-hour day. They need to be more protective when work shifts are longer.

Heat Exposure, Protective Clothing and Activity Level – There are many factors that go into the equation when trying to determine how much is “Too Hot”.
A common problem faced by many workers is the requirement to wear fire resistant or other types of protective clothing while performing working hard strenuous work in hot environments. NIOSH has confirmed many instances where required PPE was highly dangerous to workers with regard to heat stress.
PPE adds burden on hot jobs

Workers wearing protective clothing in hot environments require regular breaks in cooled areas and routine, monitoring, fluid intake etc. These protections should be written into the site specific heat stress prevention program and be part of the worker education program about heat stress prevention. Note that break times are increased greatly when protective clothing is worn. Full Protective gear lowers the allowable temperature by 10.8*F in all categories.

Case Example – A worker on full protective clothing should have a 50% rest/50% work routine when working in an environment with an average temperature of 71.2*F [82*F – 10.8*F = 71.2*F]

TABLE III:4-2. PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT VALUE [American Conference of Governmental Industrial Hygienists - ACGIH]

<table>
<thead>
<tr>
<th>Work/rest regimen</th>
<th>Light</th>
<th>Moderate</th>
<th>Heavy</th>
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</thead>
<tbody>
<tr>
<td>Continuous work</td>
<td>30.0°C (86°F)</td>
<td>26.7°C (80°F)</td>
<td>25.0°C (77°F)</td>
</tr>
<tr>
<td>75% Work, 25% rest, each hour</td>
<td>30.6°C (87°F)</td>
<td>28.0°C (82°F)</td>
<td>25.9°C (78°F)</td>
</tr>
<tr>
<td>50% Work, 50% rest, each hour</td>
<td>31.4°C (89°F)</td>
<td>29.4°C (85°F)</td>
<td>27.9°C (82°F)</td>
</tr>
<tr>
<td>25% Work, 75% rest, each hour</td>
<td>32.2°C (90°F)</td>
<td>31.1°C (88°F)</td>
<td>30.0°C (86°F)</td>
</tr>
</tbody>
</table>

*Values are in °C and °F, WBGT.

These TLV's are based on the assumption that nearly all acclimatized, fully clothed
workers with adequate water and salt intake should be able to function effectively under the given working conditions without exceeding a deep body temperature of 38°C (100.4°F). They are also based on the assumption that the WBGT of the resting place is the same or very close to that of the workplace. Where the WBGT of the work area is different from that of the rest area, a time-weighted average should be used (consult the ACGIH 1992-1993 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices (1992).

These TLV's apply to physically fit and acclimatized individuals wearing light summer clothing. If heavier clothing that impedes sweat or has a higher insulation value is required, the permissible heat exposure TLV's in Table III:4-2 must be reduced by the corrections shown in Table III:4-3.

Next Steps to Protect Workers from Heat Exposure

<table>
<thead>
<tr>
<th>Union Safety Committee Members and Union Representatives</th>
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<tbody>
<tr>
<td>1. Consider doing a survey to identify the jobs and situations in which workers have felt the most effects from heat</td>
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<tr>
<td>2. Become knowledgeable about the history, sources and possible solutions for heat exposure in your workplace.</td>
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<td>3. Evaluate the high priority jobs to assure that everything is being done to control the sources of heat and implement all possible methods to protect workers from excess heat.</td>
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<tr>
<td>4. Request a copy of all company documentation related to the Workplace Heat Prevention Program. This includes descriptions of heat related incidents, training program materials, acclimatization programs, methods used to monitor heat exposure, heat index levels that trigger preventive measures, rest break schedules, controls and other information.</td>
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<tr>
<td>5. Make sure workers are trained in the effects, signs and symptoms and controls for work-related heat illness and injury.</td>
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<td>6. Identify the members of management who have the authority and responsibility to carry out the components of the Workplace Heat Prevention Program. The Union should be involved in planning for and evaluating these programs.</td>
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<td>7. Audit the implementation of the program when heat index triggers are reached.</td>
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<tr>
<td>8. Assure that workers can readily notify management about any problems related to heat exposures on their job without any fear of reprisal. The union should receive copies of notifications.</td>
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<td>9. If problems continue to exist related to implementation of effective controls, develop a plan to pressure management to improve the program to make it more effective.</td>
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<td>10. Develop a plan to address this issue through contract negotiation if this does not get resolved thoroughly.</td>
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<tr>
<td>Workers</td>
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<tr>
<td>---------</td>
</tr>
<tr>
<td>1. Become knowledgeable about the history, sources and possible solutions of heat exposure in your work area or department.</td>
</tr>
<tr>
<td>3. Check your job and other jobs in your department to insure controls are being implemented and safe procedures are followed to protect workers from heat stress.</td>
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<tr>
<td>4. Communicate heat stress concerns and suggestions to change your job and reduce workplace heat exposure.</td>
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<tr>
<td>5. Reduce your personal risk factors for heat related illness by continuous fluid intake and regular break intervals</td>
</tr>
</tbody>
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### Useful resources and references

**www.osha.gov** -

- **Heat Stress: General Work-Place Review.** Contains a list of factors that should be considered when investigating heat stress in the workplace.
- **Heat Stress-Related Illness or Accident Follow-up.** Includes a brief list of questions to answer when investigating a heat stress illness or accident.
- **Measurement of Wet Bulb Globe Temperature.** Provides a brief overview of how to measure and calculate the Wet Bulb Globe Temperature. OSHA has a Heat Stress Tool for mobile smart phones for a free download.

**www.niosh.cdc**

- **Working in Hot Environments.** US Department of Health and Humans Services (DHHS), National Institute for Occupational Safety and Health (NIOSH) Publication No. 86-112, (1986, April). Provides employers and workers with an overview of the health hazards associated with work in hot environments and to alerts them to the precautions that should be taken to prevent injuries and other health problems caused by heat stress.

**www.usw.org**

- The USW website has lots of helpful information for workers including great health and safety resources, fact sheets and links to other sites.