

Heat Stress

Presented By:

Lynn Totsky, Health Supervisor

General Industry Safety & Health Division

Michigan Occupational Safety & Health Administration

Michigan Department of Licensing and Regulatory Affairs

www.michigan.gov/miosha

(517) 322-1831



Objectives

- Case study of a heat stress related fatality.
- MIOSHA investigation procedures for heat stress investigations.
- Elements of a heat stress management program.

Currently, heat stress citations are issued as a violation of the General Duty Clause.

Michigan Occupational Safety and Health Act 154 of 1974

408.1011 – Duties of employer.

Sec 11. An employer shall: (a) furnish to each employee, employment and a place of employment which is free from recognized hazards that are causing, or are likely to cause, death or serious physical harm to the employee.

Violation Statement

The employer did not furnish to each employee, employment and a place of employment, which was free from recognized hazards that were causing, or were likely to cause, death or serious physical harm to the employee. Employees were exposed to hazards associated with working in a hot environment (i.e. hot and humid conditions) during cooking and kitchen job tasks that could lead to serious harm or death to employees. One employee died due to heat related illness from heat exposure while performing prep cook job duties.

Citation Abatement

One feasible abatement method, among others, to correct this hazard is to develop a heat stress management program that provides specific procedures to be followed for heat-related emergency situations.

Elements of a Heat Stress Program

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

WBGT

- Wet-bulb globe temperature.
- Index of the environmental contribution to heat stress.
- Influenced by air temperature, radiant heat, air movement, and humidity.

ACGIH

- The American Conference of Governmental Industrial Hygienists.
- Publish guidelines known as Threshold Limit Values (TLVs).
- Established screening criteria, based on WBGT and work demands, to evaluate heat stress.

Investigation of Exposure

- Work load assessment (activities, time)
- Body temperature measurements
- Wet-bulb globe temperature (WBGT)
- HSI – heat stress index
- Controls – ventilation, fans, shielding
- Acclimatization
- Fluid replacement
- Work practices – training, monitoring

Employee exposure during fatality

- One kitchen prep employee developed symptoms such as disorientation, heavy breathing, and sweating. According to the manager, "he was red in the face, sweating, and was making mistakes," and that this employee, "kept walking into the walk-in cooler to cool off."
- The manager did not summon EMS, the manager told the employee to "go home and take a shower to cool off." The employee drove home and was found dead in the garage. EMS was called. An autopsy was conducted.
- Autopsy findings included "hyperthermia, exposure to high ambient temperature (approximately 120 degrees)" that "hyperthermia was contributory. He was exposed to very high ambient temperature at his work."

Employee Exposure During Fatality

- Employees were exposed to a heat index up to 92.2 degrees Fahrenheit.
- Air temperatures exceeded 86 degrees Fahrenheit at 11:53 a.m. with a humidity of 53% during the workshift.

Employees exposed to heat sources in kitchen:
grill, broilers, ovens, steam tables, fryers



Employee heat exposure from pizza ovens



Heat exposure near dishwasher: steam



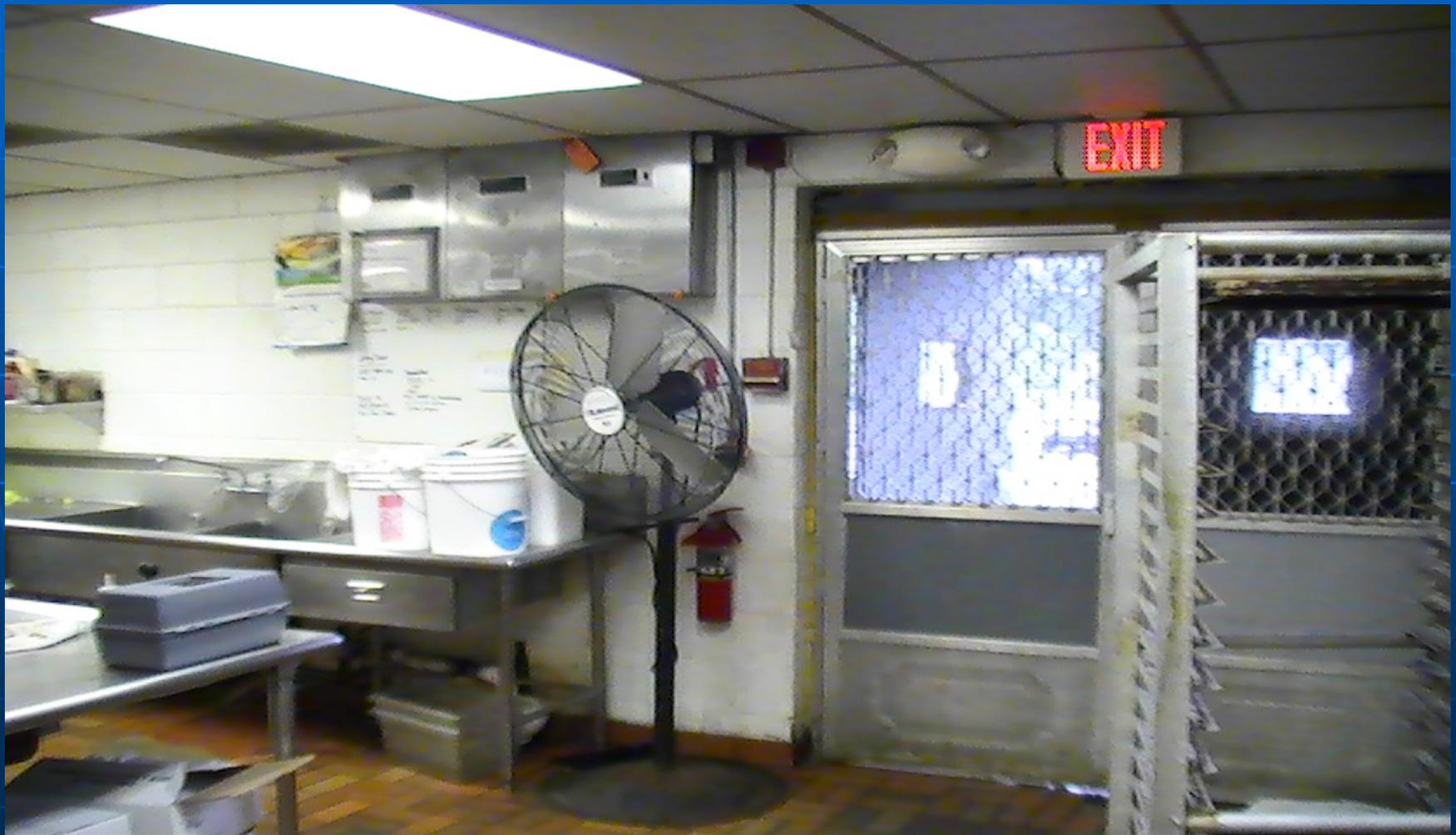
Heat exposure in prep area: ovens, sauce pots, soup pots



Heat Reduction During Inspection

- During the investigation, it was noted that exhaust fans were located at the prep cook ovens, the pizza oven, and the cook stations; a circulating fan was used in the prep cook area.
- Employer provided no supply of cool air to employees.

Heat reduction: only a fan in the prep area



Heat reduction: exhaust above ovens



Heat Reduction Abatement

- Ventilation – provide general air movement through use of supply and exhaust ventilation. Dilute hot air with cooler air.
- If central air conditioning is not feasible, portable air chillers can be used.
- Fans will increase air flow as long as the air temperature is less than the worker's skin temperature.
- Insulate hot work surfaces that generate heat.
- Shields can reduce radiant heat.

Administrative Controls

- Establish provisions for a work/rest regimen.
- Decrease employee exposure to high temperatures.
- Decrease work rate and increase the rest periods in a cool area.
- Purchase a temperature monitoring and tracking procedure to monitor actual temperature in all areas of the restaurant.

Controls During Inspection

- During the investigation it was noted that breaks were not taken by employees according to the ACGIH® recommendations for frequency.
- Employees were not allowed sufficient recovery time for heat exposure. Employees did not take breaks while performing cooking duties.
- The employer did not establish a break schedule for kitchen employees.

Controls Abatement

- Reduce physical demands, pacing
- Rest periods with water breaks
- Provide cool recovery area
- Adjust shift during cool part of the day
- Use relief workers

Acclimatization

The physiological adaptation to heat exposure. After acclimatization, the same activity will produce fewer cardiovascular demands.

Acclimatization During Inspection

During the investigation, it was noted the employees were acclimated to the heat exposure.

Acclimatization Abatement

- Establish a heat acclimatization program to increase heat tolerance to new employees and employees returning from periods of absence of 3 or more days.
- Expose employees to work in a hot environment for progressively longer periods. 50% on one day, 60% on day two, 80% on day three, 100% on day four.

Personal Protective Equipment (PPE)

- Instruct employees to wear light-colored, loose-fitting, breathable clothing, such as cotton.
- Provides for evaporation of sweat from the skin.
- Does not restrict heat removal.

PPE During Inspection

During inspection, it was noted that employees were wearing cotton clothing.

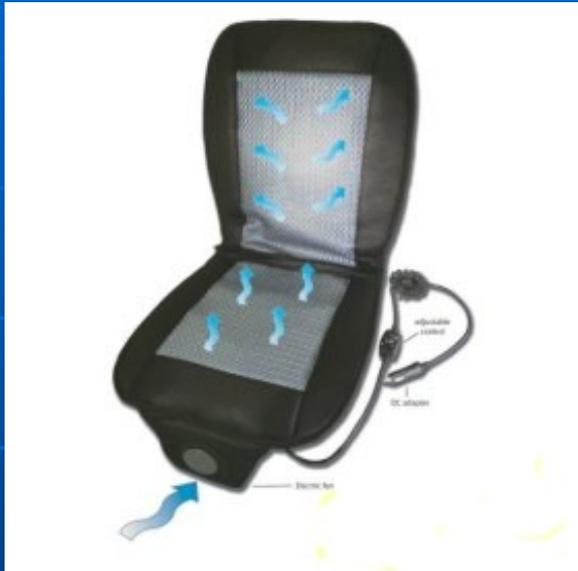
PPE Abatement

- Loose-fitting cotton clothing
- Reflective clothing – radiant heat
- Ice/cooling vests
- Wetted clothing
- Neck wraps/bandanas
- Cooling caps

PPE Examples



PPE Examples



Information and Training

Train employees and supervisors by providing accurate verbal and written instructions about heat stress, including self-determination of exposures, reporting of illnesses, and specific procedures to be followed for heat-related emergency situations.

Training during Inspection

During the investigation it was noted that employees were not trained on the signs or symptoms of heat stress. This included no training for members of management.

Training Abatement

- Train employees, including members of management, to recognize the signs and symptoms of heat stress, including encouragement to report illnesses.
- Conduct daily pre-shift meetings on days involving extreme heat, to remind employees of the effects of heat stress and how to recognize, report and respond to heat-induced illness.

Training Abatement

- Train employees to stay hydrated.
- Provide each employee with a portable card setting forth the signs and symptoms of heat-induced illness and the elements of appropriate first aid in the event of a heat-induced illness.

Hygiene Practices

- Encourage fluid replacement and the use of proper clothing. Employees should drink small volumes (approximately 1 cup) of cool water every 20 minutes.
- Avoid drinks with caffeine, alcohol, and large amounts of sugar.

Hygiene Practices During Inspection

During the investigation, it was noted that most employees did drink water.

Medical Surveillance

Perform pre-placement screening to identify those employees susceptible to systemic heat injury.

Medical Surveillance during Inspection

The investigation revealed the employer did not screen employees to identify those employees more susceptible to heat.

Medical Surveillance Abatement

- Perform pre-placement screening. Predisposing factors of employees such as age, weight, and cardiovascular system should be accounted for.
- Perform wellness checks at high temperatures; use heat stress instruments to monitor the work environment.
- Use the National Weather Services Heat Advisory days so the work/rest regimens may be adjusted.

Medical Surveillance Abatement

- Allow self-limitation of exposure.
- Encourage co-worker observation to detect signs and symptoms of heat strain in others.
- Provide medical management of heat related illnesses in the early stages. Make provisions so that first-aid can be administered immediately to employees displaying symptoms of heat-related illness.

Medical Surveillance Abatement

The employer is not limited to the abatement methods suggested; the methods explained are general and may not be effective in all cases. Other methods of abatement may be equally or more appropriate. Ultimate responsibility for determining the most appropriate abatement rest with the employer, given its extensive knowledge of specific conditions on its worksite(s).

Resources

- MIOSHA
- OSHA
- CDC
- NIOSH
- ACGIH

Questions?

Thank You For Attending This Presentation

Michigan Department of Licensing and Regulatory Affairs
Michigan Occupational Safety & Health Administration
7150 Harris Drive, P.O. Box 30643
Lansing, Michigan 48909-8143

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