Working In Heat and Effects Fatigue
Objectives of Safety in Heat

- To provide information for managing work in heat at facilities
- Pass on industry experience for managing ‘Working in Heat’ – Direct Sunlight and process Heat
- Give examples of how to manage Work in Heat in maintain operations
- Increasing awareness about high temperatures and ways to control work in these processes.
What Can Managers Do

- Develop ‘Work in Heat Program’ – HSE
- Have well embedded Risk Assessment for the following:
  - Working in direct sunlight
  - Working in hot areas
- Scheduling work in cooler times evening
- Educate employees the requirements for hydration, avoid drinks with caffeine and sugar (Deploy drinking stations)
- Provide shaded areas during break times and monitor
- Deploy buddy system
- Selection PPE
Discuss - Example Process Heat

Kiln Temperature Profile
Employees should avoid exposure to extreme heat, direct exposure to sun, and rehydrate when possible.

- **Employees Should:**
  - Wear loose light-colored clothes
  - Request support when undertaking heavy work
  - Understand risks associated with ‘Working in Heat’
  - Rehydrate (Drink water don’t become thirsty)
  - Ensure you take rest
  - Check urine
Urine colour chart

This urine colour chart will give you an idea of whether a person is drinking enough or is dehydrated (lost too much water from the body).

**ARE YOU DRINKING ENOUGH?**

- **Very dehydrated**
  - Drink a large bottle of water immediately

- **Dehydrated**
  - Drink 2-3 glasses of water now

- **Somewhat dehydrated**
  - Drink a large glass of water now

- **Hydrated – you are drinking enough**
  - Keep drinking at the same rate.

*Be Aware! If you are taking single vitamin supplements or a multivitamin supplement, some of the vitamins in the supplements can change the colour of the urine for a few hours, making it bright yellow or discoloured.
Effects of Body Fluid Loss

**THE EFFECT OF BODY WATER LOSS ON PERFORMANCE**

<table>
<thead>
<tr>
<th>Loss</th>
<th>Impact</th>
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</thead>
<tbody>
<tr>
<td>2%</td>
<td>Impaired performance</td>
</tr>
<tr>
<td>4%</td>
<td>Capacity for muscular work declines</td>
</tr>
<tr>
<td>6%</td>
<td>Heat exhaustion</td>
</tr>
<tr>
<td>8%</td>
<td>Hallucination</td>
</tr>
<tr>
<td>10%</td>
<td>Circulatory collapse and heat strokes</td>
</tr>
</tbody>
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**MONITORING HYDRATION**

- **TARGET**
- **DEHYDRATION**
- **SEVERE DEHYDRATION**

You can monitor your hydration level using the pee chart above. When you are well hydrated, your pee should be the colour of pale straw. This relates to colour 1 or 2 on the chart.
Body must balance the heat transferred into the body, heat generated in the body and heat dissipated to the environment to maintain core body temperature approximately $37^\circ$C.
When considering work you should consider the following:

- Pace the work
- Age of employee
- Physical build and fitness
- Medication/Underlying Illness (diabetes, cardiovascular disease)
- Previous heat related illnesses
- Understand heat related illness
- Identify and report hazards associated with heat-related illness
Environmental Factors

When undertaking risk assessment consider the following:

- Temperature
- Relative Humidity
- Radiant Heat
Work Related Factors

Workload

- Type of work – duration intensity
- Level of physical activity
- Time spent working

Clothing

- Weight (heavy v. breathable)
- Color (dark v. light)
- Personal protective equipment and clothing
Risk Reduction Regulate Exposure Time

Allowing employees to enter only when the temperature is below a set level or at cooler times of the day.

Issuing permits to work that specify how long your employees should work in situations where there is a risk of heat illness.

Providing periodic rest breaks and rest facilities in cooler conditions - shaded areas.
Prevent dehydration. Working in a hot environment causes sweating which helps keep people cool but means losing vital water that must be replaced. Provide cool water in the workplace and encourage workers to drink it frequently in small amounts before, during (where possible) and after working.

Identify employees who are more susceptible to heat stress because of an illness, condition or medication that may contribute to the early onset of heat stress, eg pregnant women or those with heart conditions. You may need advice from an occupational health professional.

Monitor the health of workers at risk. Where a residual risk remains after implementing as many control measures as practicable, you may need to monitor the health of workers exposed to the risk. You should then seek advice from an occupational health professional.
Working in Heat – Risk Assessment

Heat stress risk assessments should consider:

- Individual characteristics
- Nature of the work
- Environmental conditions - under which work is to be carried out
Assessing Risk

How severe the risk is:

Whether existing control measures are effective

What action you should take to control the risk, and how urgently you need to take act.

To assess the risk you should consider:

What is the impact of the hazard, and

How likely is the hazard to cause harm.
Risk Considerations – The Work

Where is the work being done?

Working near heat sources (for example, hot plant or hot surfaces) or in the sun increases exposure to heat.

Is the work physically demanding?

How long will the worker be doing physically demanding work?

Physical effort increases the risk of heat-related illness, even in moderate conditions.

How long will the worker be exposed to heat?

When and where can they take breaks?

Extended exposure to heat makes it harder for the body to stay cool.

Is the work complex or difficult - Concentration may be affected by heat.
Risk Considerations – The Work

• Automate work if possible
• Move work indoors to cool areas
• Reduce manual handling use mechanical aids
• Minimise work at height and confined space working
• Modify targets and work rates
• Minimise lone working
• Schedule work breaks
Workload

- Suitable maintained equipment available to minimise exertion during work
- Trolleys available to transport materials
- Transport available to move heavier equipment - minimise team movement of equipment
- Work organised to minimise intensity and pace on workers body
- Job rotation
Heat Stress Checklist

Fatigue and Work in Heat

Fatigue Definition

‘an acute and/or ongoing state of tiredness that leads to mental or physical exhaustion and prevents people from functioning within normal boundaries’
Fatigue and Work in Heat

When assessing work in heat you must also factor in the effects on work fatigue.

In the context of occupational health and safety, fatigue refers to mental or physical exhaustion that reduces one’s capacity to perform work safely and effectively.

Extreme heat makes the body work harder using up valuable body fluids resulting in dehydration which is one symptom of fatigue.
Fatigue

Some of the most common reasons for fatigue include:

- Prolonged or intense mental or physical activity
- Sleep loss or disrupted sleep
- Travel
- Organizational change
- Irregular work scheduling or excessively long shifts
- Strenuous activity
- Long commutes to and from work
- Extremely hot work environments
Effects Fatigue

Reduced ability to:

Concentrate and avoid distraction

Think laterally and analytically

Poor decision making – Able to recognize hazards and assess risk

Poor ability to remember and recall events and their sequences

Maintain concentration levels

Control emotions

Appreciate complex situations - Communicate effectively.
Causes of Fatigue

Fatigue can be caused by work and non-work related factors

The time of day work takes place Length of time spent at work

Type and duration of work

Work environment - Second jobs

Quality and quantity of rest before and after work

Family commitments

Individual health factors

Repetitive, monotonous work
Fatigue - At Risk Groups

The following groups are at a particularly high risk for fatigue:

- Night shift employees
- Employees working longer than 8 hours per shift
- Employees working in extreme temperatures
- Employees performing physically intense labor
- Employees who must mentally concentrate for long periods of time
- Employees working in noisy environments
- Employees performing highly repetitive tasks
Employees certainly play a role in preventing fatigue and some of the causes go beyond the workplace, but there are still several things employers can do to reduce fatigue at work.

An effective approach to fatigue risk management should involve some or all of the following:

Shift scheduling: consistent schedules, frequent breaks, one days off each week, and no more than four-night shifts in a row

Supervisor and management training on monitoring and identifying fatigue in workers

Workplace design: cool atmosphere, low humidity, plenty of natural light, minimal noise and vibrations

Balancing workloads and staffing

Reporting system for fatigue-related incidents
Other factors to consider

• Ensure risk management processes are in place

• Minimize systems of work that could increase fatigue

• Provide training and information to workers about the signs, symptoms, and risks related to fatigue

• Ensure workers performing shift work are properly supervised

• Give workers adequate notice between shift changes and rotations

• Save high-risk work for the day shift when workers are more alert
Fatigue Effects

Fatigue can lead to the following:

Depression

Obesity

Cardiovascular disease

Reproductive complications

Fatigue can also lead to lack of concentration leading to increased accidents, incidents, loss of productivity, increase absence.
Summary

Work in Heat and Worker Fatigue Requires
Management Knowledge and Understanding
Job Planning
Supervision
Risk Analysis
Controls

Remember in Heat PPE is not Always the Solution
It can be part of the Problem