

## Mines Safety Matters

# Heat-related illnesses at mining and exploration operations

Heat-related illnesses can affect both indoor and outdoor workers who work in a hot environment with limited air movement. The risk exists whether working on a mine site or exploration operation, in a processing plant, refinery, building or undercover structure in hot weather. Working in the vicinity of a heat source, such as machinery, vehicles, heavy mobile equipment, or a furnace or gold room, can also increase the risk.

People are normally able to maintain a constant internal body temperature (37.2 °C) by balancing heat gain with heat loss. While heat is gained from metabolism, physical activity and the environment, the body cools through heat loss from the skin by thermal conduction, convection and radiation, with hydration and sweat playing a major role. Under warm or hot conditions, evaporation of sweat from the skin is most effective in dissipating heat from the body. However, when humidity exceeds 75 per cent, evaporation does not occur.

When the body works hard and is not able to cool down under hot conditions, it can overheat, resulting in heat-related illness. There is a range of progressive heat-related conditions, including dehydration, heat rash, heat cramps, fainting (heat syncope), heat exhaustion and heat stroke which can be fatal. If the internal body temperature rises and exceeds 40 °C, damage to critical organs (including brain, liver, kidneys and muscle) can occur with devastating results.

## Signs and symptoms

Failure to identify heat-related illness is common and affected workers themselves may not be aware they are suffering. Therefore, workers should be trained to identify the warning signs of heat-related illness and remain vigilant.

Warning signs are often non-specific, including headache, feeling hot, weak or fatigued, and working slower or showing poor judgment.

These warning signs can increase in severity and include the following symptoms:

- discomfort (flushed skin, increased sweating, heat rashes or prickly heat)
- mild heat illness (feeling tired, weak or dizzy, cramps, reduced work capacity, reduced attention span, irritability)
- heat exhaustion (weakness, feeling unable to continue, headache, nausea, fainting, low blood pressure, breathlessness, heavy sweating, cool, pale and clammy or flushed skin, possible muscle cramps, normal to slightly elevated temperature, and reduced or dark urine)

- heat stroke (may involve signs or symptoms as above before loss of consciousness; hot and dry skin, seizures, rapid breathing, rapid pulse, low blood pressure, dark urine, perhaps absence of sweating; altered mental state, such as irritability, confusion, speech problems, unsteady gait, seizures, coma; cardiac arrest and high body temperature above 40 °C).

A timely identification of early heat-related illness is essential to prevent progression to heat exhaustion or heat stroke. Prompt access to first aid and emergency medical attention should be provided.

## Other risk factors

Some people are more susceptible to heat-related illness. These include the elderly, obese, those with cardiac conditions, damaged skin (such as healed burns that can impair sweat production) or fevers, and workers who are not acclimatised (such as by flying from cool conditions at home to hot remote work locations).

The risk of heat-related illness may also be increased by alcohol use. Medications (diuretics, beta-blockers, calcium channel blockers, cardiovascular drugs), may predispose people to dehydration and impaired response to heat.

## Prevention

- Standard risk assessments and management plans in place to control the risks and review control measures.
- Workers trained in the prevention and identification of heat-related illnesses.
- Reinforcement of the importance of drinking more water frequently in a hot environment with ready access to cool drinking water.
- Engineering controls, for example:
  - shelter and shading from sun
  - insulation (radiant barriers and reflective insulation systems reflect heat and help to keep building and workspaces cooler)
  - fans, windows, ventilation and air conditioning
  - locating hot processes away from workers
  - installing shields or barriers to reduce radiant heat from furnaces or hot vessels
  - removing heated air or steam from hot processes using local exhaust ventilation.
- Administration controls, for example:
  - rescheduling work to the cooler part of the day or in cooler times of the year
  - reducing the time spent on hot tasks via job or task rotation
  - providing additional rest breaks in cool, shaded areas
  - specific provisions for workers who are working alone or in remote areas, including managing risks of vehicle breakdowns
  - using mechanical aids to reduce physical exertion.
- PPE, for example:
  - loose-fitting protective clothing
  - use of ice vests and liquid or air circulating systems worn under PPE in specific situations.

## Legislative requirements

The work health and safety legislation requires a person conducting a business or undertaking (PCBU), including the mine operator, to protect workers from hazards, including extremes in temperature, so far as is practicable.

Once a heat stress risk is identified, the PCBU must implement controls to protect workers, maintain those controls so they are fit for purpose and review those control measures to ensure they remain effective.

All mine operations, including exploration activities, are required to have a mine safety management system (MSMS). As part of the MSMS, the mine operator must maintain a health management plan that identifies and considers all aspects of mining operations, which may adversely affect workers' health, such as heat. The mine air quality officer and underground ventilation officer have responsibilities to identify, measure and advise management on controls to regulate heat and humidity hazards.

Identifying the risks of heat stress is important. Obvious factors, such as temperature, humidity and air movement must be considered, but less obvious factors like the physical workload, clothing and PPE being worn, presence of shade, job rotation, frequency of rest breaks, acclimatisation status of workers, and their fitness and health also need to also be considered.

When conducting a heat stress risk assessment, there are a number of methods and tools that are available. Some provide advice on controls that can be considered. These are often referred to as 'heat stress calculators'. The tools used must be appropriate to the climate and specific area the assessment is for.

## Further information

For more information about managing the safety hazards of extreme heat in your workplace, visit:

### WorkSafe

- [Working safely in hot conditions](#)

### Safe Work Australia

- [Managing the risks of working in heat: Guide](#)