Hot Worksites and Health: The Risky Business of Working in the Heat.

Heat Stress Controls

June 2, 2022

1 888 730 7821 (Toll free Ontario)
workplacesafetynorth.ca

Heat Stress Controls

Once the risk for heat stress has been assessed, controls should be put into place to prevent heat-related illness.

Controls for heat stress prevention and management generally fall into 3 categories:

1. Engineering Controls
2. Administrative Controls
3. Personal Protective Equipment (PPE)

Engineering Controls

– reducing heat at source (eliminate if possible)

- Controlling heat at source (e.g. insulation, blinds on windows, exhaust hot air or steam, radiant shielding).
- Ventilation (general and local)
- General and local air conditioning
- Air-conditioned rest areas & cooling booths for breaks.
- Utilize cooling fans if temperature is <35°C.
- Actively cool body with misters.
- Use less labor-intensive tools (e.g. mechanical aids, mechanization)

Particularly, when cooling work environment is difficult

Workplace Safety North

ONTARIO MINE RESCUE

Administrative Controls

Minimize worker exposure &
Increase time for recovery

- Have an established and enforced heat stress policy.
- Controlling internal heat generation:
  - reduce workload, pace, and duration
  - increase the frequency rest breaks (or have workers perform lighter duties in cool areas)
  - establish and follow work-rest regimes
  - assign extra workers
  - schedule strenuous jobs to cooler times of day
  - ensure good nutrition and rest (fruits and vegetables)
- Ensure proper acclimatization of workers.

Administrative Controls

- Train workers to recognize early signs and symptoms of heat stress.
- Provide accessible drinking water (encourage workers to drink cool water every 15-20 minutes (even if not thirsty).
- Self monitoring and co-worker observation (buddy system).
- Develop a hot-weather plan (such as the Humidex, ACGIH, etc.).

Workplace Safety North

ONTARIO MINE RESCUE

Personal Protective Equipment

- If appropriate, light summer or breathable clothing should be worn.
- In case of high radiant heat, reflective clothing may help.
- Cooling vests and water-cooled garments.
- For very hot environments, air, water or ice-cooled insulated clothing should be considered.

Workplace Safety North

ONTARIO MINE RESCUE

Protective Clothing and Heat Stress

- Protective clothing can inhibit the sweat evaporation due to lack of permeation. This could increase the body internal temperature and thus cause heat strain.
- Vapor barrier clothing can also increase heat stress on the body.
- Extra caution should be taken in performing heat stress evaluation.
- Remove protective clothing during breaks to improve sweat evaporation and reduce body temperature.
- Passive or active cooling during rest and replenish fluids in the body.

Workplace Safety North

ONTARIO MINE RESCUE

Heat Stress Control Guidance

- **Acclimatization**
  - Acclimate new and returning workers to hot environments and gradually increase workload.
  - Can take up to 2-3 days for returning employees to re-acclimatize and up to 14 days for new employees to be fully acclimatized.
  - Can be lost quickly
- **Buddy system**
  - Assess each other's symptoms for heat related illness
- **Face coverings**
  - Provide face coverings that are lightweight and light in colour
  - Consider more frequent rest breaks to account for additional heat stress of wearing a face covering

Workplace Safety North

ONTARIO MINE RESCUE

Heat Stress Control Guidance

- **Ventilation**
  - Make sure indoor facilities are well ventilated
  - In non-climate controlled facilities, increase outdoor air circulation as much as possible to promote evaporation of sweat
- **Medical Screening/Monitoring Program**
  - Pre-placement and periodic medical examinations may be required to those routinely exposed to high levels of heat (with medical conditions).
  - Workers can self monitor body weight, urine frequency/duration and color as indicators of possible dehydration.

IMPORTANT

Never ignore anyone's signs or symptoms, no matter what the temperature or humidex!

Ignoring signs and symptoms in the early stages will result in progressively increased danger.

Workplace Safety North

ONTARIO MINE RESCUE

What to do for Heat-Related Illness

Call 911 (if Required)

While waiting for help to arrive you should do the following:

- Move worker to a cool shaded place
- Loosen or remove heavy clothing
- Provide cool water / sports drink to worker
- Fan and mist worker with water

Workplace Safety North

ONTARIO MINE RESCUE

Proposed Mining Legislation

Amendments are being proposed to Regulation 854 (Mines and Mining Plants) pertaining to managing heat:

- Add a new provision requiring that mine or mining plants, in consultation with the joint health and safety committee or health and safety representative, if any, develop and maintain a procedure for managing the heat/ temperature in the workplace to protect the health and safety of workers.

Comments currently under review.

https://www.ontariocanada.com/registry/view.do?postingId=37907&language=en

Workplace Safety North

ONTARIO MINE RESCUE

Heat Stress Management Policy/Program

Heat Stress Management Policy/Program:

- Risk Assessment (e.g. what factors contribute to heat illnesses)
- Exposure Guidelines and Industrial Hygiene Monitoring
- Controls (Engineering, Administrative, PPE)
- Medical Screening and Surveillance Program
- First aid and procedures for getting medical attention
- Liquid replacement and cool rest areas.
- Heat acclimatization program
- Scheduling of work and work/rest schedules
- Roles and responsibilities for the program
- Training (e.g. responsibilities, causes, signs/symptoms, first aid, predisposing factors, etc.)

Workplace Safety North

ONTARIO MINE RESCUE

Summary

- Prevention is the best form of treatment.
- Learn the signs and symptoms of heat-related illness.
- Monitor yourself and your coworkers (buddy system).
- Block out direct sun or other heat sources
- Use cooling fans/air-conditioning and rest regularly
- Drink lots of water
- Wear lightweight, light coloured and loose-fitting clothing
- Avoid drinking alcohol and caffeinated drinks
- Implement a Heat Stress Prevention Program

Workplace Safety North

ONTARIO MINE RESCUE

New Study!

uOttawa

CANADA-WIDE SCAN TO EVALUATE HEAT STRESS IN THE MINING INDUSTRY

AN INDUSTRY DRIVEN RESEARCH PROJECT

DR. GLEN P. KENNY
Director, Human & Environmental Physiology Research Unit

EMILY TETZLAFF, R.KIN
Ph.D. Candidate, Human & Environmental Physiology Research Unit

DEFINING EFFECTIVE HEAT STRESS/HEAT STRAIN IDENTIFICATION AND MANAGEMENT STRATEGIES FOR THE MINING INDUSTRY

WHAT IS THE PROBLEM TO BE ADDRESSED?

Heat stress is a deadly occupational hazard that is projected to increase in severity with global warming. While upper limits for heat stress designed to protect all workers have been recommended by government and occupational safety institutes for some time (e.g., ACGIH guidelines), heat stress continues to compromise health and productivity.

Nearly all workers in the mining industry experience moderate to high levels of occupational heat strain resulting in:

- impaired mental function, physical discomfort, as well as deterioration in physical performance (e.g., impaired motor dexterity and coordination), and
- in more severe cases heat-related injury or even death.

Even in temperate environments, a workers' ability to thermoregulate is impaired due to:

- high levels of metabolic heat production (due to the increased work intensity) and
- the blunted heat loss caused by the insulation and limited permeability of personal protective equipment.

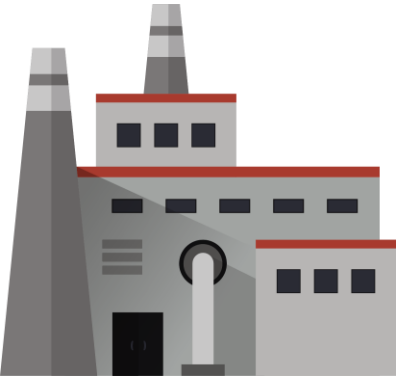
Additionally, miners face a unique set of risk factors for heat-induced injury associated with:

- stress and overexertion, which are worsened during prolonged exposure to high temperatures and excessive fluid losses (due to sweating).

While recent studies assessing miners (including mine rescuers) provide unique information about the physical demands and the physiological strain experienced by miners, these studies have evaluated a relatively small number of workers, demographics, and locations. Therefore, we have only a superficial understanding of the key factors contributing to excessive heat stress/strain across the mining industry, which limits our ability to design practical and effective heat-mitigation strategies to safeguard worker health and safety.

WHAT IS THE AIM OF THE STUDY?

To develop effective heat stress/heat strain identification and management strategies to protect miners against the potentially harmful effects of a prolonged heat exposure.



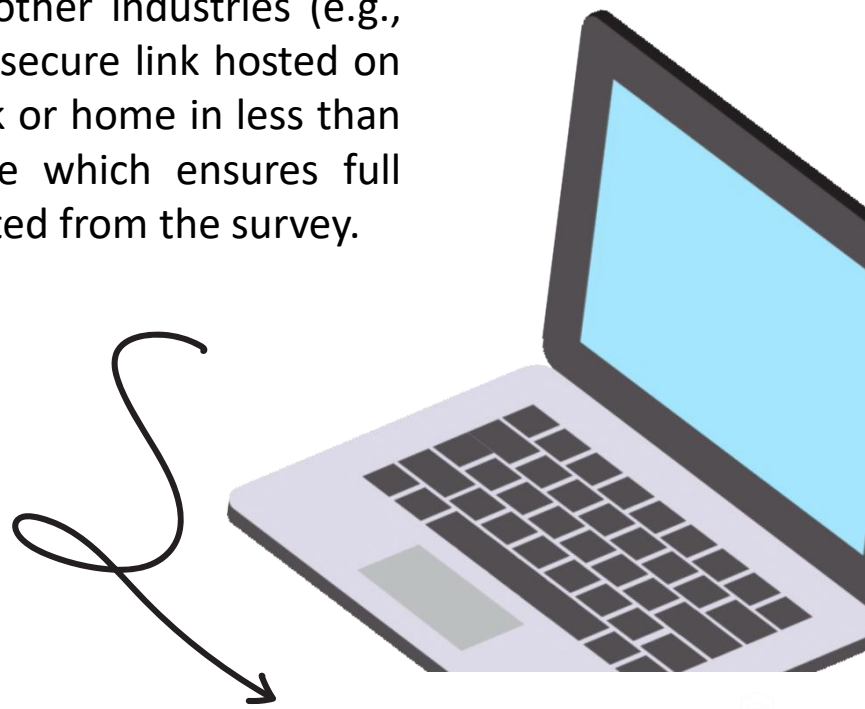
WHO CAN PARTICIPATE IN THE STUDY?

To achieve this important objective, two heat stress questionnaires have been developed to advance our understanding of how heat stress/heat strain is viewed and managed within the industry (including underground mines, open-pit miners, smelters, refineries, and exploration projects) by both Health and Safety Personnel and front-line workers.

HOW IS THE QUESTIONNAIRE ADMINISTERED?

Two heat stress questionnaires have been developed to advance our understanding of how heat stress/heat strain is viewed and managed within the industry by both Health and Safety Managers/Directors and Front-Line workers.

The questionnaires, which have also been used in other industries (e.g., electric utility) are completely anonymously, using a secure link hosted on SurveyMonkey. The survey can be completed at work or home in less than 15 minutes. Survey Monkey is a fully secured site which ensures full confidentially of the responder and of the data collected from the survey.



FRONT-LINE WORKERS

English: https://www.surveymonkey.com/r/DCMD3L9

French: https://www.surveymonkey.com/r/ZBBP2FQ

HEALTH AND SAFETY PERSONNEL

English: https://www.surveymonkey.com/r/VWKLH7Q

French: https://www.surveymonkey.com/r/ZHKZYJC

FRONT-LINE WORKER QUESTIONNAIRE

This questionnaire includes the following concepts:

- **Personal Characteristics** (e.g., age, sex, height, weight)
- **Occupational Description** (e.g., sector, occupational title, years of experience, location, work schedule, production incentives, employment type)
- **Heat Stress Exposure** (e.g., perceived risk, primary task assignments, heat-related signs/symptoms, heat-related illnesses, urination rate/colour, weight loss over shift length)
- **Heat Strain Score Index (HSSI)** (e.g.,environmental,work intensity, heat strain indicators, etc.)
- **Self-Management Practices** (e.g., work effort medication, personal strategies, water/electrolyte consumption)
- **Current Workplace Management Practices** (e.g., mitigation of heat stress, strategies in use, reporting culture, environmental changes)
- **Heat Stress Vulnerability** (e.g., health conditions, medication use, medical history, heat-related illness not at work)
- **Lifestyle Determinants of Heat Stress Susceptibility** (e.g., alcohol consumption, tobacco use, sleep, energy drinks, physical activity, water source, pesticide use)
- **Additional Comments**

OHS PERSONNEL QUESTIONNAIRE

This questionnaire includes the following concepts:

- **Occupational Background** (e.g., sector, occupational title, years of experience, Site Size, Demographics)
- **Workplace Heat Stress Risk** (e.g., seasonal risk, heat stress reporting, use of energy drinks, incentive programs)
- **Heat Stress Management Program** (e.g., real-time monitoring, environmental assessment strategies, use of ACGIH TLV, pre-task assessments, training, vulnerability screening, provision of electrolyte replacement, break areas)
- **Heat Stress Emergency Response** (e.g., heat-related illness, training, treatment, rural/remote location)
- **Environmental Monitoring for Heat Stress** (e.g., techniques, sources, heat wave planning)
- **Legislation and Governance** (e.g., OHS / mining-specific legislation, provincial/territorial guidance, information and resources)
- **Additional Comments**

HOW WILL THE RESULTS OF THIS QUESTIONNAIRE BE USED?

The questionnaire results will help:

1. **Identify the level of physiological strain** (and therefore risk of a heat-related or heat-induced injuries) a worker may face during the performance of their regular duties.

2. **Increase awareness about the risks associated with exposure to heat** and help managers/directors as well as workers understand those factors which may increase a worker's risk of experience dangerous levels of heat stress/heat strain.

3. Help guide companies in **revising management strategies**, if and where needed.

4. Health and Safety personnel can use the data acquired from the worker survey to **assess the effectiveness of current heat stress management programs.**

If you have any questions about the project,
please contact Dr. Glen Kenny or Emily Tetzlaff.

Dr. Glen Kenny	gkenny@uottawa.ca	Dr. Glen P. Kenny	@HEPRU_uOttawa	www.hepru.ca
Emily Tetzlaff	etetz085@uottawa.ca	Emily Tetzlaff	@emtetzlaff	www.hepru.ca

Montpetit Hall, University of Ottawa, 125 Universite Pvt. Ottawa, Ontario K1N 6N5, Canada

Thank you

Thank you for attending today's webinar and helping make workplaces safer.

Andre Gauvin MHK, CCPE, CIH

Occupational Hygienist

Occupational Health Clinics for Ontario Workers (OHCOW)

Tel: 705-523-2330

Email: agauvin@ohcow.on.ca

Sandra Dorman PhD

Full Professor/Director

Centre for Research in Occupational Safety and Health (CROSH)

Tel: 705-675-1151 x. 1015

Email: sdorman@laurentian.ca

Keith Birnie P.Eng

Industrial Hygiene and Ventilation Specialist

Workplace Safety North (WSN)

Tel: 705-474-7233 ext. 324

Email: keithbirnie@workplacesafetynorth.ca