

Heat Stress Procedure

Purpose

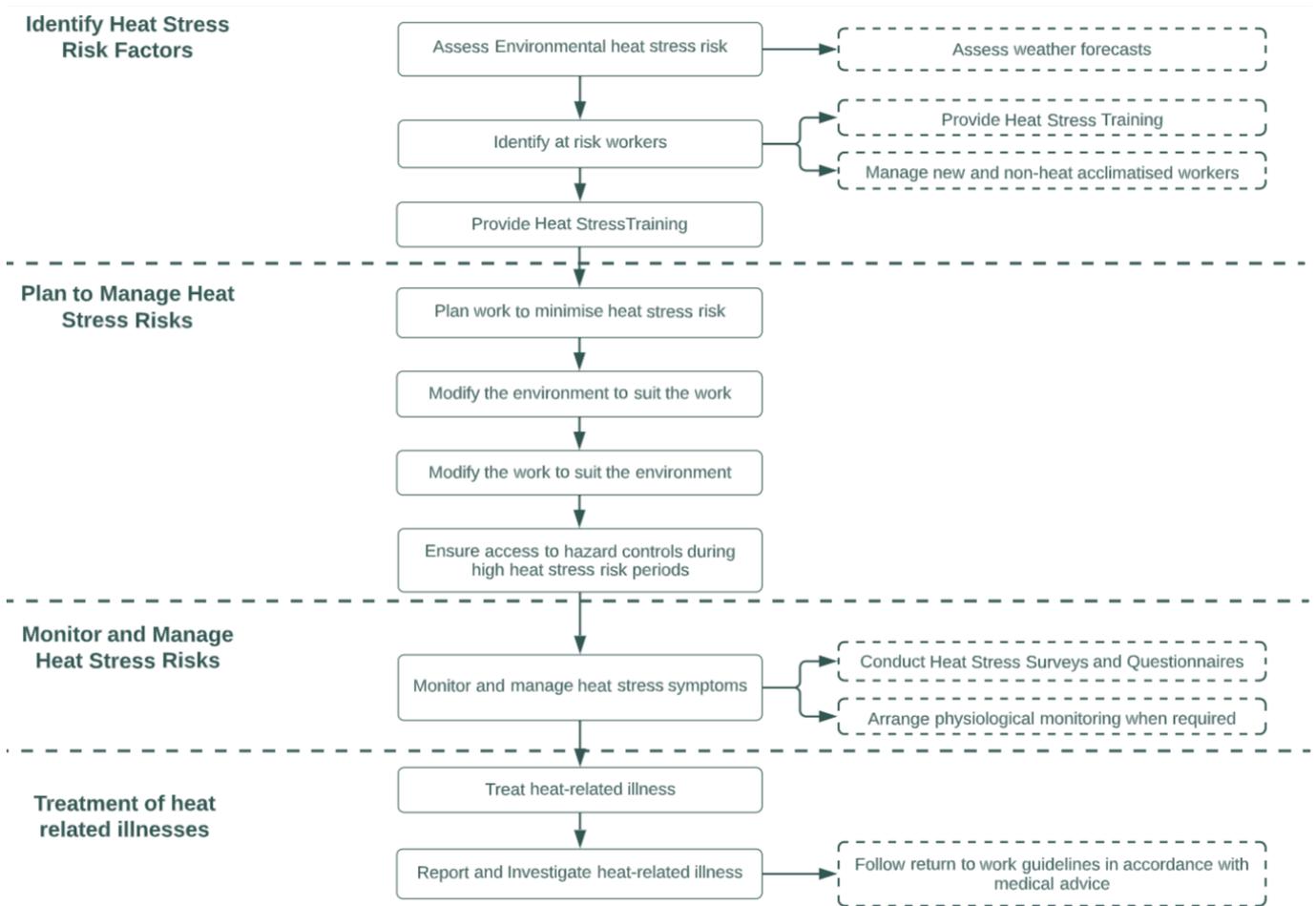
The purpose of this Procedure is to define the process for managing the risks arising from working in hot/dry and hot/humid conditions for or on behalf of Queensland Hydro. Heat stress is defined as the net heat load to which a Worker is exposed. In the context of this document, heat refers to hot/dry and hot/humid conditions or both.

Scope

This Procedure applies to Queensland Hydro for all activities where there is potential for heat stress. This Procedure also applies to Contractors when working under the Queensland Hydro HS Management System (HSMS) or when directed under Contract.

Document ID: HS-PRO-0011		Title: Heat Stress Procedure		
Author:	Kelly Palmer	Head of Health and Safety	Version Date:	23/05/2023
Approver:	Greg Tonks	Acting EGM, Corporate	Revision ID:	A

Process Map



Heat Stress Procedure

Procedure

1 Identify Heat Stress Risk Factors

1.1 Assess Environmental Heat Stress Risk

As part of the job planning process, the person responsible for planning work must assess whether the environmental heat stress risk is classified as high based upon the work region and month of planned works according to **Table 1**.

TABLE 1 – High heat stress risk periods of the Queensland Hydro work regions

Region	High Heat Stress Risk Period
Southern	October - March
Central	September - March
Northern	September - April

Additionally, when working outside the times stated in **Table 1**, the person responsible for planning work must assess the seven-day meteorological forecast to determine the likelihood of workers being exposed to unseasonably hot (and humid) conditions.

During high heat stress risk periods, Workers must have access to and the ability to implement all hazard controls of **section 2.4**. The Manager/Supervisor of the Workers must ensure that Workers implement hazard controls, as required.

1.2 Identify At-Risk Workers

The Supervisor/Manager, in consultation with the person responsible for planning work and the Workers, will identify at-risk Workers and implement heat stress management planning to minimise the risks of heat stress. At risk Workers include:

- New starters to the workforce;
- Workers returning from medical leave;
- Workers with medical conditions that can affect the individual's ability to regulate body temperature;
- Workers that have previously been diagnosed with heat stroke;
- Non-heat acclimatised workers (a worker who has been away from their normal role for a period of greater than 21 calendar days); and
- Workers with lack of fitness and/or advanced age.

1.3 Manage New and Non-Heat Acclimatised Workers

To reduce the risk of heat stress, a temporary modification of work duties and responsibilities may be necessary at the discretion of the Supervisor/Manager. This may include the use of acclimatisation scheduling. Suitable schedules for Workers returning to work are presented in **Tables 2 and 3**.

In addition, the following should be enacted:

- Workers must notify their Supervisor/Manager of heat acclimatisation status or that they have had an extended period away from work (21 days or greater);

- Buddy System – where practical pair new Workers and non-heat acclimatised personnel with experienced, heat acclimatised Workers who can monitor their Co-Workers for signs and symptoms of heat related illness and provide adequate supervision;
- Work planning – wherever possible, plan the work to eliminate the risks associated with working in heat; and
- Provision of adequate shade, cooling, drinking water and access to first aid facilities.

Acclimatisation protocols should be applied where work is to be conducted during a high heat stress risk period. Heat acclimatisation defines the biological and behavioural adaptations in response to heat stress that improve heat tolerance. Each Worker adapts to heat exposure differently based on a host of personal factors, hence **Table 2 and 3** provide a guideline for introduction or reintroduction of Workers to high heat stress risk environments. Gradual heat acclimatisation should be used in conjunction with the other hazard controls of this Procedure.

TABLE 2 – Heat acclimatisation program for new Workers

Suggested Acclimatisation program for New Workers	
Day 1	20% of usual work
Day 2	40% of usual work
Day 3	60% of usual work
Day 4	80% of usual work
Day 5	100% of usual work

TABLE 3 – Heat acclimatisation program for Workers returning from an absence of 21 or more days

Suggested Acclimatisation program for Workers with previous experience with the same job	
Day 1	50% of usual work
Day 2	60% of usual work
Day 3	80% of usual work
Day 4	100% of usual work
Day 5	100% of usual work

1.3.1 Additional heat stress risk factors

In addition to identifying high heat stress risk periods and at-risk Workers, daily factors for the Manager/Supervisor to consider that may contribute to heat stress risk include:

- Physical work rate;
- Working near hot surfaces;
- Extended periods of heat exposure;
- Number of Workers allocated to tasks;
- Task complexity;
- Level of personal protective equipment (PPE) required to be worn;
- Plant factors including enclosed spaces, access to shade and cooling; and
- Fitness for work factors in addition to heat acclimatisation and heat stress education.

1.4 Provide Heat Stress Awareness Training

The Manager/Supervisor must ensure heat stress training is provided regularly to workers who work in hot/dry and/or hot/humid conditions. Regular 'refresher' education must also be provided via toolbox talks and associated communication techniques, prior to commencing work in hot conditions during high heat stress risk periods.

2 Plan to Manage Heat Stress Risks

2.1 Plan Work to Minimise Heat Stress Risk

The Manager/Supervisor and the Workers must do everything that is reasonably practicable to eliminate the risks associated with working in heat. This may include cancelling certain work tasks, rescheduling tasks to cooler parts of the work shift. When the risk associated with heat stress cannot be eliminated, the risks must be minimised as much as reasonably practicable. A range of strategies may need to be utilised to minimise such risk.

2.2 Modify the Environment to Suit the Work

The Manager/Supervisor will consider modifying the environment of workplace to suit the work. This could include the following:

2.2.1 Controlling the source of environmental heat

- Use shade barriers (e.g. temporary gazebos) over the work area to block solar radiation;
- Reduce the temperature of the source of heat (e.g. allow the section of plant or equipment to cool before work commences);
- Insulate hot surfaces (can also provide protection from contact burns);
- Clad or cover sources of radiant heat; and
- Use radiant heat shields or barriers (need to have good insulation properties and low emissivity/high reflectivity so they don't become hot).

2.2.2 Ventilation, air conditioning and air movement

- Increase air movement in the work area e.g. fans; and
- Remove or dilute hot/humid air and replace it with cooler/drier air. Examples include:
 - Mechanical ventilation which draws cool air from outside the work area to displace the hotter air;
 - Natural ventilation via windows, doors and roof vents/louvres; and
 - Artificial cooling such as evaporative coolers, air conditioning or chillers.

2.3 Modify the Work to Suit the Environment

The Manager/Supervisor must consider modifying the work to suit the environment in consultation with the work group, in accordance with the **HS Communication and Consultation Procedure (HS-PRO-0002)**. This could include the following:

- Use mechanical aids such as cranes, forklifts and earthmoving plant to reduce the physical workload on a worker;
- Conduct work at ground level or organise work to minimise climbing up and down stairs and ladders;
- Conduct work indoors or in a shaded area; and
- Any other measure that limits body heat production through physical work or heat exposure.

2.4 Ensure access to Hazard Controls

The Manager/Supervisor must ensure Workers have access to hazard controls during high heat stress risk periods. This includes:

- Ensuring Workers have access to adequate fluids throughout the work shift;
- Where practical, ensuring workers have access to means to produce crushed ice for consumption during work shift;
- Ensuring Workers have access to appropriate first aid kit for management of any heat related illnesses; and
- Where practical, promoting use of cool areas as refuges for Workers to limit heat exposure. Cool areas can range from temporary gazebos through to insulated structures or cabins which are air-conditioned.

TABLE 4 – Examples of Hazard controls

Hazard control	Equipment	Procedure
Ice Towel	<ul style="list-style-type: none"> • Esky, bucket or similar Ice • Cold water Towels 	<ul style="list-style-type: none"> • Remove upper body Personal Protective Equipment (PPE); • Soak towels in iced water (as generally contained within an esky); • Drain and place over as much of the upper body skin surface as possible; and • Replace towels every 2-3 minutes or as they become warm.
Crushed ice ingestion	<ul style="list-style-type: none"> • Blender/Ice shaver or equivalent • Ice fit for human consumption • Cold water Flavouring • Cups 	<ul style="list-style-type: none"> • Fill blender with cubed ice; • Add water until ice is almost covered; • Add flavour as required; • Blend until smooth consistency; and • Consume approximately 2-3mL ice per kg body mass as a starting point (approximately 1 cup for the average person).
Air Conditioning	<ul style="list-style-type: none"> • Air-conditioned container, vehicle or room 	<ul style="list-style-type: none"> • Enter air-conditioned area and rest; • Replace sweat soaked PPE to maintain thermal comfort while cooling; • Removal of PPE may be required for Workers with substantially elevated core temperature; • Creating airflow with fans will also increase heat loss; and • A minimum exposure period of 10 minutes is required.
Air flow cooling	<ul style="list-style-type: none"> • Shaded area, use of marquee or awning if necessary • Fans (mains of battery powered) • Power and power leads Dust free area • Matting (for dusty areas) 	<ul style="list-style-type: none"> • Establish a shaded area for cooling; • Set up fans ~5m from where Workers will rest; • Removal of upper body PPE will expedite cooling; and • Leave sweat on the body to assist evaporative cooling.

NOTE: To achieve such cooling, it is recommended that 'emergency cooling kits' consisting of an esky/ice bin or similar insulated container containing towels or equivalent be available at all work sites during high risk periods. The kits should be located proximal to cold water and ice supplies or be preloaded for work crews during shifts considered to have a high risk of heat stress.

2.4.1 Administrative controls

The following are administrative controls that could be applied with managing the risk of heat stress:

- Scheduling of work to avoid high heat stress risk periods where possible and practical;
- Allocation of Workers to high heat stress risk tasks that are fit for work;
- Allocation of Workers such that rotation of duties and rest breaks can be taken as required;
- Where practical new Workers and those returning from an absence of 21 days or more should not perform work alone; and
- Provide access to appropriate PPE, in accordance with the **PPE Management Procedure (HS-PRO-0001)**.

3 Monitor and Manage Heat Stress Risks in the Field

3.1 Monitor and Manage Heat Stress Symptoms

When planning work the person responsible for planning the work must identify whether heat stress monitoring of Workers exposed to high heat stress risk periods is warranted. The Manager/Supervisor must consult Workers regularly throughout the work shift to identify signs and symptoms of heat stress.

3.1.1 Worker monitoring

Worker monitoring can be achieved informally (combination of observation and asking how work colleagues are feeling) or formally. Formal heat stress assessment is done by a daily using the **Heat Stress Symptoms Questionnaire Form (HS-FRM-0032)**.

If required, the Manager/Supervisor will ensure that:

- Workers have access to daily or seasonal heat stress questionnaires as required;
- Questionnaires are utilised to assess subjective responses to work in the heat; and
- Physiological monitoring is arranged when required.

Note: A range of personal factors including minor illness, specific medications, lack of heat acclimatisation, lack of fitness, advanced age and previous incidence of heat-related illness, can make a Worker more susceptible to heat related illness. Manager/Supervisor must alert workers to this risk and monitor them closely as far as is reasonably practicable.

3.1.2 Physiological monitoring

Physiological monitoring may be undertaken to measure individual responses whilst working in hot and humid conditions. Such monitoring provides a scientific standard of quantifying the following measurements:

- Core body temperature;
- Heart rate;
- Sweat rate; and
- Hydration.

Physiological monitoring contributes to management of heat stress risk by evaluating responses to working and determining the adequacy of or the need for hazard controls. Monitoring results assist in worker education, and therefore, results must be communicated to the workers.

Physiological monitoring requirements should be determined and performed by a suitably qualified professional to ensure the appropriate duty of care to the Workers. Note that participation in physiological monitoring is voluntary, with Workers not required to participate. To engage a suitably qualified professional, contact the Health and Wellbeing Manager.

4 Treat Heat-Related Illness

All Queensland Hydro Workers that are exposed to heat must have access to appropriately trained First Aiders and through heat stress training sessions, be able to identify heat stress emergencies and apply basic first aid appropriate to the circumstance. **Table 6** provides treatment guidance based upon signs and symptoms of heat-related illness. If symptoms don't improve – seek medical treatment.

TABLE 6 – Signs, symptoms and treatment of heat-related illness.

Heat-related illness	Signs and Symptoms	Treatment
Dehydration	<ul style="list-style-type: none"> Mild to severe thirst; Dry lips and tongue; Headache; Reduced or dark urine output. and Body mass loss in excess of 2% during work shift. 	<ul style="list-style-type: none"> Consume water; Relocate to a cool area; Loosen or remove unnecessary clothing, including PPE; and Electrolyte replenishment may be necessary with fluids and/or food.
Heat Rash	<ul style="list-style-type: none"> Itchy rash with small raised red spots; Prickling sensation of affected area during sweating; Generally occurs where PPE creates friction with sweaty skin, such as back, chest, waist, thighs, groin, upper arms and neck; and Severe cases can cause heat intolerance due to decreased sweat production in affected area that lowers evaporative cooling. 	<ul style="list-style-type: none"> Relocate worker to a cooler, less humid environment; Keep the affected area dry and remove unnecessary clothing, including PPE; May require regular replacement of sweat soaked PPE throughout the work shift; and Severe rash may require a period of weeks to resolve.
Heat Cramps	<ul style="list-style-type: none"> Painful muscles spasms due to prolonged heat stress; and Generally occurs in the lower body and abdomen. 	<ul style="list-style-type: none"> Stop activity and rest in a cool area; Stretch affected muscles; Cooling and massage of affected muscles may assist; and Rehydrate with an electrolyte solution and consume food.
Heat syncope	<ul style="list-style-type: none"> Fainting (heat syncope) can occur while standing or rising from a sitting position. May occur due to prolonged standing 	<ul style="list-style-type: none"> Lie the patient on their back in a cool area with airflow; and Elevate the patient's legs.

Heat exhaustion	<ul style="list-style-type: none"> • Weakness or fatigue; Pale skin; • Anxiety; Dizziness; Thirst; • Profuse sweating; Irritability; and • Patient may have elevated temperature, but exhaustion can occur after worker has cooled. 	<ul style="list-style-type: none"> • First aid – Danger, Response, Send for help, Airway, Breathing, Circulation, Defibrillation (DRSABCD Action Plan); • Request for an ambulance/medical by calling 000/112; • Move the worker to a cool place with circulating air; • Notify Manager/Supervisor; • Maintain communication with patient • Where applicable, relocate patient to air-conditioned vehicle or room. Use shade where air-conditioning is not available. • Remove upper body outer garments as a minimum; • Where patient appears hot, dip towels/clothing in iced water, drain and place over patient, covering as much of the body surface/skin as possible including head and neck region; • Create and maintain air flow over their body; • Remove towels and repeat dipping them in iced water and placing over patient. This process should be completed every 2 mins to ensure towels remain cold; • Continue to maintain communication with patient; • Where prolonged cooling is deemed appropriate, removal of socks and boots will assist heat loss; • Cease cooling where patient becomes asymptomatic, reports feeling cold and/or begins to shiver; and • Continue to observe patient until the paramedics/medical support arrive and assume control of patient.
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Heat Stroke	<ul style="list-style-type: none"> • High body temperature above 40oC, skin will be hot to touch; • Profound fatigue; Pale skin; Disorientation; Confusion; Dizziness; • Irrational and unusual behaviour; Inappropriate comments; Irritability; • Headache; • Loss of balance and muscle function resulting in collapse; • Hyperventilation; Vomiting; Diarrhea; Delirium; Seizures; and • Loss of consciousness or coma. 	<ul style="list-style-type: none"> • As for heat exhaustion noting that heat stroke treatment will be prolonged compared to that for heat exhaustion; and • Cooling must occur as soon as practical to prevent permanent organ damage.
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5 Report and Investigate Heat-Related Illness

Reporting and investigation of heat related illnesses must be undertaken in accordance with the **Incident Management Procedure (HS-PRO-0026)**.

Return to work guidelines should be developed for the affected Worker in accordance with medical advice to re- establish Worker heat tolerance prior to full duties.

Responsibilities

Who	What
Person responsible for scheduling work	<ul style="list-style-type: none"> Assessing seven day forecast and heatwave forecast for planned works; Reporting forecast daily environmental conditions to Workers; Planning the work to minimise the risk of heat stress; Identifying the need and arranging access to heat stress hazard control resources; Consult with Workers when required; and Communicate the details of environmental risk assessment to Workers, prior to commencement of the work (or as conditions change).
Manager/ Supervisor	<ul style="list-style-type: none"> Identifying at-risk Workers and implement heat stress management planning to minimise the risks of heat stress; Consult with Workers when required; Ensuring that heat stress hazard controls are implemented; Ensuring that heat stress awareness training is provided to Workers; and Provision of first aid for heat-affected Worker(s).
Workers	<ul style="list-style-type: none"> Notifying Manager/Supervisor of potential extreme heat conditions in the area where they are performing work; Presenting it for work; Notify Manager/Supervisor of their heat acclimatisation status; Informally monitor work colleagues for signs of heat stress; and Provision of first aid for heat-affected Worker(s);
Health and Wellbeing Manager	<ul style="list-style-type: none"> Provide advice and support for this Procedure; and Assist in the engagement of a suitably qualified professional for physiological monitoring where required.

Defined Terms

Terms	Definition
Hazard Controls	A range of strategies to mitigate the risk of heat stress.
Heat Acclimatisation	Biological and behavioural adaptations in response to heat stress that improve heat tolerance.
Heat Stress	Heat stress is defined as the net heat load to which a worker is exposed. Prolonged heat stress can contribute to a range of heat-related illnesses.
Supervisor/Manager	The person with the direct supervision or management of a Worker. It could be a supervisor/manager/line supervisor etc.
Risk	The potential occurrence of an adverse effect on human life or health, or the environment, because of exposure to a hazard.
Worker	Any person who carries out work for Queensland Hydro Queensland, including work as an employee, contractor, subcontractor, self-employed person, outworker, apprentice or trainee, work experience student, employee of a labour hire company placed with a 'host employer' and volunteers.

References

Document code	Document title
HS-PRO-0026	Incident Management Procedure
HS-FRM-0032	Heat Stress Symptoms Questionnaire
HS-PRO-0001	PPE Management Procedure
HS-PRO-0002	HS Communication and Consultation Procedure