Guideline 2.3.1

Managing Heat Stress

The ACT Rural Fire Service Chief Officer has issued this Guideline under Section 38(1) of the *Emergency Act 2004* – A Chief Officer may determine standards and protocols.

Purpose

This guideline provides a risk control that promotes effective heat stress management practices.

It should be used in conjunction with the JACS Working in the Heat Guidelines.

It provides guidance for Incident Controllers (IC), Officers in Charge (OIC) and Crew Leaders to manage their own heat stress as well as heat stress of the personnel they are leading. It provides guidance for rostering, personnel logistics and work activity decisions that relate to heat stress management.

Scope

This guideline is applicable to all personnel from the ACT Rural Fire Service brigades, as defined in the Emergencies Act 2004, and crews deployed from interstate, engaged in firefighting operations within the ACT.

Background

Heat stress is a general term used to describe a range of potentially harmful medical conditions that can happen when the body is unable to cope with working in heat.

Heat stress can occur when the body fails to maintain normal healthy body temperatures (37°C) due to exercise, work or environmental conditions, including the wearing of PPE/PPC.

General symptoms include:

- Heat rash (prickly heat) – an itchy rash of small raised red spots on the face, neck, back, chest and thighs caused by a hot and moist environment
- Heat cramps – painful cramps in muscles, caused by heavy sweating that uses up the body's supply of salt and water
- Worsening of pre-existing illnesses and conditions
- Changed behaviour.

More severe symptoms of heat stress include:

- Heat exhaustion – a mild to moderate heat illness characterised by an inability to maintain cardiac output. Body temperatures are generally in the range 38—40°C. Symptoms include weakness, fatigue, dizziness, visual disturbance, feeling of intense thirst and heat, nausea, vomiting, palpitations, tingling of fingers or toes after exposure to a hot environment.
- Heat injury – a moderate to severe illness with injury to liver, renal, gut and muscle tissue. Body temperatures are generally in excess of 40°C.

- Heat stroke – a severe illness with profound central nervous system injury. Heat stroke is defined in medical terms as having a core temperature in excess of 40.5°C.

Responsibilities

All members	Take personal responsibility to maintain adequate hydration and electrolyte replacement during shifts. As far as practicable, adopt a comfortable working pace on the incident ground. Maximise hydration and cooling strategies between shifts. Report any heat stress concerns – for themselves or for colleagues – to their Crew Leader. Where possible, operate at a comfortable distance from a fire.
Crew Leader/Supervisor	Manage any reported heat stress issues with personnel. Ensure that all personnel in their command are rotated away from intense heat conditions and are supplied with adequate hydration and electrolyte replacement during their shift. Report any heat stress concerns – for themselves or for personnel in their crew – to the IC/OIC.
Incident Controllers/Officers in Charge (IC/OIC)	Include consideration of heat stress as part of risk assessment. Ensure adequate supplies of water and electrolyte are available throughout an operation. Ensure crews are briefed on incident action plans and control measures, including heat stress management. Arrange medical support if notified by a supervisor of heat stress issue. For prolonged operations or in extreme conditions, ensure medical support is on standby. Ensure task rotation to reduce exposure to extreme heat and heavy workload. Ensure hydration procedures and rest periods are used. In hot conditions, create a rehabilitation area designed for rest, hydration and cooling, a safe distance away from hazards. Plan for and implement cooling techniques as required by the operating environment.

Applicability of this guideline

RFS personnel and others acting under their direction will comply with this guideline wherever deployed at any incident or community engagement activity. The IMTs, agency representatives and agency personnel are responsible for compliance with this guideline.

Operational guideline

Managing and mitigating the risk of heat stress

Work methods and procedures should be developed and implemented to minimise the risk that heat stress presents in both emergency and non-emergency operations.

The following table provides a guideline for average-sized, heat-acclimatised workers wearing 'station wear' (e.g. non-PPE/PPC). When wearing firefighting PPE/PPC add 7°C to the Wet Bulb Global Temperature (WBGT) for moderate or hard work and 3°C for easy work.

Note, water consumption should not exceed 1.5l/hr without an electrolyte replacement program.

Work / rest and water consumption table for emergency responders [1]

		Easy work		Moderate work		Heavy work	
Heat category	WBGT Index °C*	Work/rest (min)	Water intake (L/hr)	Work/rest (min)	Water intake (L/hr)	Work/rest (min)	Water intake (L/hr)
1	25.5–27.7	No Limit	0.5	No Limit	0.75	40/20 min	0.75
2 (Green)	27.8–29.4	No Limit	0.5	50/10 min	0.75	30/30 min	1
3 (Yellow)	29.5–31.1	No Limit	0.75	40/20 min	0.75	30/30 min	1
4 (Red)	31.2–32.2	No Limit	0.75	30/30 min	0.75	20/40 min	1
5 (Black)	> 32.2	50/10 min	1	20/40 min	1	10/50 min	1

* Temperature of that moment in time, measured by the WGBT.

1 US Department of the Army 2002. *Health Service Support in a Nuclear, Biological, and Chemical Environment. Tactics, Techniques, and Procedures*. Washington, DC: Headquarters, DA; 2002. FM 4-02.7.
Tuornisky, SD (ed.) 2008. *Medical Aspects of Chemical Warfare*. Office of the Surgeon General, United States Army: Falls Church, Virginia. p. 520.

Plans and procedures

The Incident Controller (IC) should include consideration of heat stress as part of the risk assessment for an operation and plan supplies and rosters to mitigate the risk.

This assessment and planning should include:

- environmental conditions
- work rates
- task rotation
- other resources required.

Health status and hydration

Physical health is an important factor in reducing individual risk of heat stress.

Pre-hydration through maintaining fluid intake before and during a shift are important strategies for reducing the risk of heat stress.

Electrolyte supplementation should be considered for extended duration operations.

Heat stress is also an important factor to consider in preparation for deployment to hotter environments.

Rostering and breaks

Where possible, ICs should ensure that a rest/work protocol is followed to maximise recovery from heat exposure.

When taking a break, firefighters should ideally have a rest area where they can safely remove their PPE/PPC to maximise body cooling after working in a hot environment.

ICs and crew leaders should rotate crews/crew members working in hot environments, where possible.

Rehabilitation and rest area

For prolonged or extreme heat/humidity incidents, the IC/IMT should establish a rest and rehabilitation area. The area should:

- be set up in a safe place
- be upwind of smoke and other airborne hazards
- be large enough for all resting personnel
- provide shade, seating and other items to assist in reducing body temperatures and enhance comfort
- provide access to cool drinks and food
- be conveniently located for access
- allow room for personnel to remove non-essential PPE/PPC.

For prolonged operations, the IC/IMT should also consider use of the Rehabilitation POD from ACT Fire and Rescue.

Health monitoring

All personnel should monitor themselves for any symptoms of heat-related illness and report any issues to crew leaders.

In extreme conditions, the IC may establish medical support at the rest and rehabilitation area.

Cooling hyperthermic personnel

In extreme conditions, it may be necessary to cool personnel both before and after a work shift.

Both passive and active cooling techniques may be necessary.

Passive cooling techniques allow the body to self-regulate. These techniques include:

- selection of clothing under the PPE/PPC to allow evaporation of sweat from the body
- removing PPE/PPC when it is safe to do so
- accessing air-conditioning (vehicles) and shade
- access to cold water and electrolyte supplements.

Active cooling techniques that can be applied in the field include:

- misting fans
- icepacks applied to armpits and groin
- air conditioning
- wet towels.

Active cooling techniques that can be applied under medical supervision include:

- whole body immersion
- hand and forearm immersion
- ingesting iced slush drinks
- ice vests

Access to these techniques may be limited by the circumstances of the operation.

Appendix 1: Checklist for consideration by IC and supervisors

The following table provides a checklist for incident controllers to consider for different operational conditions at ambient dry bulb temperatures.

Normal working conditions 27.8—29.4°C	Are all crews being monitored for signs of fatigue and heat illness? Are hydration procedures and rest periods being followed?
Hot working conditions 29.5—31.1°C	Are all crews being monitored for signs of fatigue and heat illness? Are extra supplies of water and electrolyte fluids available? Are appropriate resources being deployed to allow for appropriate work/rest cycles? Should resources be limited, consider task rotation. Are hydration procedures and rest periods being followed? Are cooling techniques, including access for members to air conditioning being implemented? Are all non-essential training activities being risk-assessed?
Extreme working conditions > 31.2°C	Are all crews being monitored for signs of fatigue and heat illness? Are extra resources being deployed to assist with 15—20 minute task rotation? Are hydration procedures and electrolyte fluids available? Is medical support required and available on standby? Are active cooling procedures being deployed? Are all non-essential training activities being postponed? Are personnel wearing only essential PPE/PPC?

Document information

Version history

Author	Version	Version Approval Date	Summary of Changes
Rohan Scott	1.0		
Steve Quinlan	1.0	30/03/2023	Administrative review

Name	Title/Role	Signature	Date
Rohan Scott	CO ACT RFS		08/02/2024

Document Owner

Position	Section
RFS Director	Operations

Next review due: 01/02/2027

Related documents

Document name
AFAC Guideline: Managing Heat Stress in Emergency Response April 2017
JACS Working in the Heat Guidelines
Work Health and Safety Act 2011
SOP 1.2.2 Use of Fireground Shirt

Signed documents will be scanned and filed in TRIM.