WHS- 52 Working in Hot or Cold Conditions Procedure

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1 Purpose

The purpose of this procedure is to provide information about how extremes in hot and cold environmental temperatures can affect personnel working on Territory Generation sites. This procedure also gives advice on how to correctly identify the hazards and implement appropriate control measures to effectively manage extremes of hot and cold in the working environment.

2 Scope

This procedure applies to all personnel working on Territory Generation controlled sites who are required to work in a hot or cold environment.

NOTE: There are no set temperatures above or below which work is not permissible. The reason for this is that air temperature is only one of the determinants of thermal comfort.

3 References

- NT Work Health and Safety Act 2012
- NT Work Heal and Safety Regulations 2013
- NT WorkSafe Approved Code of Practice – *Managing the Work Environment and Facilities.*
- ACT WorkSafe - Thermal Comfort Guidance Note.
- St John Ambulance First Aid Book

4 Roles and Responsibilities

Role / Title	Responsibility
Chief Executive Officer	Shall ensure that : • All personnel are aware of requirements of this procedure and its management in sites under Territory Generation control. • Initiates procedure review as required.
All Managers/Site Coordinators	Shall ensure that: • This procedure is put in place at all Territory Generation controlled power stations sites. • Personnel are advised and trained as necessary in the procedure to be followed. • Contractors are informed of and follow the procedure, where applicable. • Contribute to procedure reviews
Project Officers/Contract Managers	Shall ensure that: • Contractors under their control are informed of and follow the procedure, where applicable. • Contribute to procedure reviews
All Personnel	Shall ensure that: • This procedure is followed personally and by contractors/visitors under their control, where applicable • Contribute to procedure reviews

Document Owner	• The position responsible for the preparation, review and accuracy of this document.
Document Sponsor	• The position responsible for the approval and use of this document

5 Definitions

Acclimatise	Means to adapt to a new temperature, altitude, climate, environment, or situation.
Approved	Means having appropriate Territory Generation endorsement in writing.
Authorised	Means a *competent person* with technical knowledge or sufficient experience who has been *approved* to act on behalf of Territory Generation to perform the duty concerned.
Competent Person	Means a person who has, through a combination of training, qualification and experience, acquired knowledge and skills enabling that person to correctly perform the specified task.
Shall	Mandatory requirement
Should	Advisory requirement

6 General information

a) Working in hot or cold conditions without adequate control measures can create a number of adverse health effects ranging from discomfort to serious illness. Under the *NT Work Health and Safety Act* 2011, Territory Generation has a responsibility to provide a safe workplace for its workers and contractors. This guideline on working in extremes of temperature aims to provide a means of ensuring that managers, supervisors and workers are aware of risks associated with working in these hot and cold environments and the associated strategies to minimise the risk of harm.

b) There are times when tasks or activities are required to be undertaken in hot or cold environments. These range from moderate to extreme conditions which may increase the level of discomfort and, possibly placing increased stressed and limitations for a person working in the area.

c) Environmental and personal factors can lead to discomfort at work. These include:

- Air temperature
- Humidity
- Air movement
- Radiant heat
- Activity level
- Clothing

7 Optimal Conditions

a) Generally comfortable conditions for people working indoors and doing light sedentary work (e.g. office work) are as follows:

- An optimal air temperature (dry bulb temperature) 20 - 26°C depending on the season ,
- Relative humidity 30 - 60%,
- Minimum recommended fresh air rate of 10 Litres per second (L/s) per person or 10 L/s per 10m2 for mechanical ventilation systems,
- Optimum air movement 0.1 - 0.5 m/s (naturally ventilated), 0.1 - 0.2 m/s (air-conditioned).

b) When conditions are not optimal they can affect productivity and efficiency. A lack of concentration as a result of discomfort can result in dehydration and an increased risk of accidents. People with existing medical conditions such as cardiovascular diseases, respiratory conditions and kidney problems can be more predisposed to adverse health effects from working in conditions that are not ideal.

8 Risk Management

a) Working in thermal conditions is a workplace hazard and is to be managed accordingly to prevent negative health effects.

b) A risk management approach incorporating the process of identification, risk assessment and control is required to be undertaken to ensure that hazards do not adversely affect the health and safety of Territory Generation staff and its contractors.

c) As with any other workplace hazard, consultation with workers must occur to ensure that the process is as effective as possible. The following details a risk management approach to working in thermal conditions.

9 Identifying Hazards

a) Identifying the sources of heat and cold is the first step in the process. Consideration should be made on the type of task and duration required for the work area.

b) The presence of the following factors may indicate a **risk of heat illness** occurring at a workplace or in a particular job or task:

- The work is physical,
- The worker has little or no control over their work flow,
- High temperatures,
- Radiant heat: from the sun (e.g. in building and construction, horticulture, agriculture etc.), ovens, molten metal, as found in smelting, steel mills, furnaces, ovens, glassworks, ironing, plastics extrusions/moulding,
- High humidity, e.g. steam cleaning, laundries, mines,
- A lot of clothing is worn, e.g. overalls, boiler suit, safety boots or shoes, welding aprons, 'all over' clothing such as 'Tyvec' suits and suits worn during insecticide spraying, spray painting, etc.
- Workers who are overweight, physically unfit, feverish, have heart/circulatory/skin conditions, are dehydrated, use certain medicines,
- Workers are not acclimatised to, and/or inexperienced in, working in heat,
- There is a heat wave in progress,

- Workers have suffered from heat illness in the past or are suffering at present.

c) The presence of the following factors may indicate a risk of **exposure to cold** occurring at a workplace or in a particular job or task:

- The work is sedentary,
- The worker has little or no control over their work flow,
- Low temperatures (such as artificially cold workplaces e.g. refrigerated areas),
- Convection cold: air speed can increase the rate of heat loss from the body and decrease the air temperature,
- Wet weather.

10 Heat related illness

a) Heat illness covers a range of medical conditions that can arise when the body is unable to properly cope with working in heat. These conditions include:

- Heat stroke - a life threatening condition that requires immediate first-aid and medical attention;
- Fainting in heat (heat syncope);
- Heat exhaustion;
- Heat cramps;
- Skin rashes (Prickly Heat);
- Heat fatigue; and,
- Worsening of pre-existing illnesses and conditions.

b) Signs and symptoms of heat illness include feelings of sickness, nausea, dizziness, weakness, clumsiness, collapse and convulsions. Workers with these signs or symptoms should seek immediate first-aid/medical attention.

c) Other health and safety problems caused by hot working conditions include:

- Sweaty hands causing a loss of grip while handling objects, controls, etc.;
- Falls and trips occurring due to fainting or fatigue;
- Mental and/or physical fatigue leading to errors and mistakes;
- Not using personal protection equipment (e.g., earmuffs, safety shoes, overalls, etc.) due to increased discomfort when it is hot;
- “Cutting corners” during work due to fatigue or discomfort;
- Heat interacting with other hazards such as chemicals and manual handling; and,
- Burns from contact with hot surfaces or substances.

11 Cold Related Illness

a) Cold-related illness covers a range of medical conditions that can arise when the body is unable to properly cope with working in cold.

b) These conditions include:

- Hypothermia – a life threatening condition that requires immediate first-aid and medical attention.
- Frostbite – Skin, muscle, blood vessels, and nerves freeze and form ice crystals.

- Immersion Foot - If part of the body is covered with water or wet mud that is just above freezing, the area may become chronically swollen, weak, and sensitive to the cold.
- Chilblain – Red, swollen skin, usually on hands and feet that feels hot, tender and itchy after cold exposure.

c) Signs and symptoms of cold related illnesses include:

- Numbness in extremities (fingers, toes);
- Loss of fine motor coordination;
- Stiffness or pain;
- Slurred speech and drowsiness;
- Slow, irregular breathing and heartbeat/pulse; and,
- Shivering.

d) Other health and safety problems caused by cold working conditions include:

- Disease flare-ups such as asthma
- Increase in injuries due to decreased dexterity, mental skills, coordination, and a general decline in performance that affects safety
- Increase the risk of injuries to muscles and tendons, such as strains and sprains
- Inability to perform tasks due to restrictions from PPE
- Burns from contact with cold surfaces or substances
- Slips due to ice.

12 Assessing the Risk

12.1 The assessment of risk involves considering those factors which make the risk apparent and real. What is the danger to people working in this type of environment, what are some problems that might arise from performing activities in this area? The elements listed below can provide an indication of how serious the heat or cold related problems can be.

- The source of heat or cold
- The duration of work in this type of environment
- The nature of the work being performed
- The level of exposure
- The physical condition or capability of the worker
- Past experiences dealing with this type of environment.

12.2 Heat related illness

a) If there is a potential risk associated heat related illness occurring at work, then a risk assessment shall be conducted. Either a task based risk assessment (Safe Work Method Statement {SWMS} or Job safety Environmental Analysis {JSEA} or equivalent; or an operational risk assessment should be conducted based on the nature and scope of the works. Where an operational risk assessment is conducted the risk matrix as outlined in the *Territory Generation Risk Management Procedure* (BDOC2014/248) should be used to indicate the level of risk associated with the work being conducted.

b) Work practices should be assessed to ensure controls are in place to manage the hazards associated with working in hot and/or cold environments. Work practices to be assessed may include the following:

- Hot work areas and workers exposed to heat ;

- Hot working conditions/heat waves/ unusually hot conditions;
- Cold working conditions and workers exposed to refrigeration etc.
- Inexperienced and un-acclimatised workers;
- Workers reporting possible heat illness conditions;
- First-aid and emergency procedures for workers suffering from heat collapse, heat stroke or heat exhaustion;
- Workers with an increased risk of heat illness (e.g. overweight, physically unfit, feverish, have heart/circulatory/skin diseases, are dehydrated, use certain medicines). Workers considered at risk for heat illness should be assessed by a doctor if there is a concern about their fitness for working in heat.

c) In some occasions it may necessary to conduct a more formal heat risk assessment involving the use of an accepted heat stress index (e.g. Wet Bulb Globe Temperature (WBGT)) carried out by a suitably competent person. The risk assessment should measure environmental conditions, WBGT, as well as including the physical workload, clothing and work organisation.

d) If the risk assessment indicates that there is a high or medium risk associated with the hazard of working in hot conditions then control measures are required to be implemented to reduce the risk to an acceptable level.

12.3 Cold related illness

a) If there is a potential risk associated with cold-related illness at work then a risk assessment shall be conducted. Either a task based risk assessment or an operational risk assessment should be conducted based on the nature and scope of the works. Where an operational risk assessment is conducted the risk matrix as outlined in the *Territory Generation Risk Management Procedure* (BDOC2014/248) should be used to indicate the level of risk associated with the work being conducted.

b) When assessing the risk, work practices should be assessed including the following:

- Cold work areas (such as refrigerated or alpine areas) and workers exposed to cold;
- Inexperienced and un-acclimatised workers;
- Workers reporting possible cold-related illness conditions;
- First-aid and emergency procedures for workers exposed to cold;
- Workers with an increased risk of cold-related illness (e.g., overweight, physically unfit, feverish, have heart/circulatory/skin diseases, are dehydrated, use certain medicines).

13 Controls to manage risk

a) The hierarchy of controls shall be used to reduce the risk of working in hot or cold environments to an acceptable level.

b) The hierarchy of controls includes techniques to minimise risk in the following order:

Control	Heat	Cold
Elimination	Examples: • Discontinue the activity	Examples: • Discontinue the activity
Substitution	Examples: • Using safer materials	Examples: • Using safer materials

Isolation	Examples: • Shielding/enclosing hot processes • Insulating hot pipework	Examples: • Shielding/enclosing cold processes • Insulating cold pipework
Engineering	Examples: • Fixing/improving faulty/inadequate ventilation and/or air conditioning systems • Providing shade for outdoor work • Shielding hot indoor sources that radiate heat (e.g. furnaces) • Enclosing the process and increasing ventilation to remove steam and hot air • Increasing air movement and ventilation.	Examples: • Implement warming shelters such as heated tents, cabins, break rooms, etc.
Administrative procedures	Examples: • Rescheduling work or particular tasks to cooler times of the day • Scheduling cooling down times for plant • Assigning more people to help with heavy or hot work; • Rotating jobs • Providing opportunities for un-acclimatised workers to acclimatise to working in heat; • Providing a cool, well-ventilated area for rest breaks; • providing fans and opening doors, windows and vents where practical • Providing free access to water/fluids • Providing drink bottles/camel backs • Ensuring work is conducted	Examples: • Raise the temperature, such as setting the refrigerated room temperature to the maximum allowable; • Postpone outdoor work to a warmer day; • Consider decreasing the time between breaks to allow workers to warm up; • Provide protection from wind and rain.

	at a sensible pace • Ensuring workers look for warning symptoms and self-monitor as they work	
*Personal protective equipment.	Examples: • Providing heat/sun-smart clothing and equipment for outdoor workers including cotton long sleeved shirts and trousers, wide brimmed hats, sunscreen etc.	Examples: • Thermal clothing; waterproof jackets etc.

NOTE: *Personal Protective Equipment (PPE) is a method to protect a person from hot and cold temperatures. The PPE should be suited to the environment and shall be:

- Properly selected for the individual and task;
- Readily available;
- Clean and functional;
- Correctly used when required; and,
- Maintained by appropriately trained staff in accordance with manufacturers' recommendation in regard to servicing the equipment, if required.

14 Training

a) All personnel with the potential for exposure to hot and cold environments while working on Territory Generation sites should be trained in the hazards, risks and control measures to protect them from these temperatures.

b) Senior First Aid Training is also recommended.

15 Working in Wet Weather

a) As part of their normal duties, personnel working on Territory Generation controlled sites may be required to work outside in wet weather. Working in wet weather conditions may change the nature of the hazards and risks associated with a particular job or task. To minimise the risk to staff the implementation of appropriate risk control is required.

b) Generally, Territory Generation sites will attempt to minimise any discomfort due to wet weather by providing appropriate personal protective equipment or scheduling alternative duties (if available).

c) A risk assessment and control approach is to be adopted in relation to assessment of tasks to be undertaken during wet weather, and implementation of appropriate risk control options. Risk assessment involves analysing the risks associated with wet weather tasks and evaluating them to determine steps required for risk control and priorities.

d) Risk assessments of any tasks to be performed during wet weather should be completed by the personnel prior to commencing the task, with the involvement of their Line Manager/Supervisor if there is any uncertainty or concerns regarding safety.

e) A task to be performed in wet weather having a risk score of 'high' must be discussed with the relevant supervisor, and appropriate risk control strategies implemented prior to commencement of the job.

f) Based on the risk assessment, hazardous tasks (i.e. risk score of high) will only be performed where the risk can be minimised to ensure an injury is prevented. If there are concerns regarding the risks presented by a wet weather task which cannot be addressed by the supervision, the Territory Generation WHS Unit should be contacted for assistance/advice.

g) Risk control measures that may be put in place with regard to working in wet weather include provision of effective and appropriate personal protective equipment, including wet weather gear.

16 Recommended first aid treatment for exposure to heat

16.1 Heat Induced Swelling – where feet and hands swell in Hot Weather.

To manage heat swelling the following actions must occur:

- Raise Legs; and,
- Do gentle exercises; and,
- Keep cool.

16.2 Heat Cramps – are painful muscle cramps, usually in legs and abdomen caused losing too much water and salt through sweating.

To manage Heat Cramps the following actions must occur:

- Stop the activity and rest in a cool environment; and,
- Gently stretch the affected muscle; and,
- Apply an ice pack; and,
- Replace fluids

16.3 Heat Exhaustion – Heat exhaustion results from being physically active in a hot environment without taking the correct precautions.

To manage Heat Exhaustion the following actions must occur:

- Move the casualty to lie down in a cool place with circulating air; and,
- Loosen tight clothing and remove unnecessary garments; and,
- Sponge with cold water; and,
- Give fluids to drink; and,
- Seek medical aid if casualty vomits or does not recover promptly.

16.4 Heat Stroke – is a potentially fatal condition. Water levels in the body become so low that sweating stops and body temperature rises.

To manage Heat Stroke the following must occur:

- Follow DRSABCD; and,
- Remove casualty to a cool place; and,
- Remove almost all clothing and loosen anything tight; and,
- Apply cold packs or ice to areas of large blood vessels (neck, groin and armpits) to accelerate cooling; and,
- If possible, cover person with a wet sheet and apply a fan to increase air circulation (stop cooling when the person is cool to touch); and,
- Call 000 for an ambulance; and,
- When the person is fully conscious, give plenty of fluids.

NOTE: This person needs urgent medical aid.

17 Recommended first aid Treatment for exposure to cold (Hypothermia)

17.1 Hypothermia – occurs when the body's temperature drops below 35 Deg C and has the potential to develop into a serious condition if not recognised and treated at an early stage.

To treat Hypothermia the following actions must occur:

- Follow DRSABCD; and,
- Remove person to a warm dry place; and,
- Protect person and yourself from wind, rain, sleet, cold and wet ground; and,
- Handle person as gently as possible; and,
- Avoid excess activity or movement; and,
- Maintain person in a horizontal position;
- Place casualty between blankets or in a sleeping bag; and,
- Cover the head to maintain body heat; and,
- Give warm drinks if conscious (but not alcoholic); and,
- Provide warmth to the casualty. Hot water bottles, heat packs and other sources of external heating may be applied to person's neck, armpits and groin (caution to be taken to avoid burns). The aim is to stabilise core temperature rather than attempt rapid rewarming; and,
- If hypothermia is severe call 000 for an ambulance; and,
- Remain with the person until medical help arrives.