

VICTORIAN INSTITUTE OF EARTH AND PLANETARY SCIENCES

Safety and Environmental Procedures and Guidelines for Field Operations

prepared by

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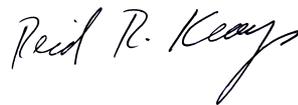
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Introduction

Exploration work often takes place in remote locations and inhospitable climates. Operating in these conditions provides a challenge for all of us to work safely and minimise our environmental impact. To be the best we must all be committed to achieving high work standards both personally and as a group, and, in particular, to be responsible for our own safety and the safety of others.

VIEPS is committed to providing a safe work place, and exploring in an environmentally responsible manner. All VIEPS staff and students are encouraged to read and become familiar with this manual.

I commend this Safety and Environmental Procedures and Guidelines for Field Operations Manual to you.



Reid R. Keays
Director
Victorian Institute of Earth and Planetary Sciences

Field Activities: Health and Safety Requirements

This policy outlines the minimum health and safety (OHS) requirements for field activities held under the auspices of the Victorian Institute for Earth & Planetary Sciences (VIEPS). Staff or students shall only participate in collaborative field activities or, field activities run by another organisation, when the activity meets the standard of the VIEPS Field Activities: Health and Safety Requirements, in addition to minimum safety standards of the participating organisation, provided they are consistent with VIEPS safety requirements.

RESPONSIBILITIES

- ¥ All participants on VIEPS field activities have the responsibility to ensure their own safety and the safety of others, by participating in field activities in a safe and competent manner, and with care in respect of other participants.
- ¥ Staff members in charge of VIEPS field activities shall be responsible for the safety of people on the field activity and for ensuring the member university and VIEPS minimum safety requirements are met.
- ¥ The head of school or department of the VIEPS member university hosting a VIEPS field activity will ensure that:
 - the field activity complies with the OHS requirements of the host University;
 - the field activity complies with the minimum VIEPS OHS requirements; and
 - staff members in charge of VIEPS field activities are aware of, and understand their safety responsibilities.
- ¥ The Director of VIEPS, in conjunction with the heads of schools or departments of the VIEPS member universities, will ensure that staff members in charge of VIEPS field activities:
 - receive appropriate training to meet their OHS responsibilities when supervising field activities.
- ¥ The VIEPS Board will ensure that:
 - adequate resources and budgetary provision are allocated to ensure VIEPS sponsored field activities meet the minimum OH&S requirements set out in this document.
 - OHS requirements of VIEPS field activities are reviewed regularly at board meetings.

HEALTH AND SAFETY REQUIREMENTS

Each Member University hosting a VIEPS field activity must comply with the following health and safety requirements:

1. Risk Management

- ¥ A comprehensive identification of the hazards to be encountered on VIEPS field activities and an assessment of the risks associated with these hazards must be undertaken during the planning for the trip.
- ¥ Staff members in charge of VIEPS activities and supervisors of students are responsible for ensuring that the risk assessment procedure has been completed before the commencement of the field activity.
- ¥ Following assessment of the risks likely to be found during the field activity, risk control measures must be adopted to minimise the risk associated with each hazard. The hierarchy of hazard controls must be used to determine the appropriate risk controls to be adopted.

- ¥ Potential hazards identified by the staff member in charge of the field activity must be disclosed to participating staff, students and volunteers before departure, together with the risk control procedures to be adopted.
- ¥ The effectiveness of risk control measures must be reviewed and improved following any incidents that occur during a field activity and before the activity recurs.

2. Provision of First Aid

- ¥ Staff trained in first aid to an appropriate level must attend the field activity.
- ¥ Sufficient first aid kits, appropriate for the field activity, must be taken on each VIEPS field activity.

3. Safety Information

- ¥ Participants of VIEPS field activities must be provided with safety information before and during field activities.
 - General safety information must be provided in written course information provided to students.
 - If appropriate, a general safety induction should be provided to students at the commencement of each year.
 - A safety briefing must be given to all participants (staff, students and volunteers) before the commencement of **each** VIEPS field activity.
 - ¥ Written safety procedures must accompany the briefing;
 - ¥ Specific information regarding safety aspects must be included in the safety briefing, eg:
 - minimum dress requirements, including a warning that correct dress is mandatory for participation in activities;
 - discussion of correct maintenance and use of safety equipment required for the various activities that are to be carried out;
 - discussion of potential hazards which are likely to be encountered and the steps individuals must take to minimise the risks associated with these hazards;
 - introductions to the staff-in-charge and first aider(s) attending the field activity.
- ¥ The safety briefing must include as a minimum:
 - the need to follow the general rules outlined in this policy;
 - the need to follow all instructions as given by the staff member in charge of a field activity.

4. Supervision

- ¥ The staff member in charge of a VIEPS field activity must determine an appropriate staff/student ratio when planning a field activity.

The staff/student ratio will depend on the type of activities being undertaken. Generally, a ratio of 1:10 is suitable for most situations. Fewer than 1 staff member to 20 students is not recommended.
- ¥ Where possible, there should be male and female supervisors for field activities involving male and female students.

5. Emergency Procedures

- ¥ Emergency procedures must be developed for each VIEPS field activity to be followed in the event of an emergency such as an injury, a deleterious change in the weather, a natural disaster such as a bushfire, etc.
- ¥ The emergency plans must include:
 - emergency protocols for personnel in the field, at the base camp and at the host university;
 - communication protocols;
 - emergency services contact numbers for local emergency services and with the host university.

6. Vehicles

- ¥ Vehicles taken on field trips must be appropriate for the conditions encountered, e.g. 4 wheel drive for off-road conditions.
- ¥ All vehicles must be checked regularly to ensure that they are roadworthy and that they contain oil, water and fuel, spare tyre (inflated), the car manual and tyre changing equipment.
- ¥ All vehicles used on field activities must travel with an appropriate first aid kit.
- ¥ The staff member in charge of the field activity must ensure that each driver is appropriately licensed and suitably trained for the driving required for the field activity.
- ¥ Anyone driving 4 wheel drive vehicles off-road must have attended an accredited 4 wheel drive training course in the last 5 years.
- ¥ The seat belts in all vehicles must be worn, properly adjusted and securely fastened by all students and staff.
- ¥ Students and staff must be made aware before starting the trip that smoking, the consumption of alcohol and the misuse of drugs are not allowed in vehicles (including any transport used to move students and staff while on official trips).

7. Safety Equipment

- ¥ The wearing of specialised safety equipment will be required in a number of field situations:
 - Safety vests - brightly coloured vests with reflective surfaces. These should be worn in all situations when visibility is a safety issue (e.g. anywhere near roads or traffic, moving machinery), regardless of ambient light conditions;
 - Hard hats - should be worn as appropriate in situations where risk of head injury is present (e.g. falling objects, low headroom);
 - Safety glasses or goggles - must be worn whenever there is a risk of eye injury;
 - Hearing protection - must be used whenever there is a risk of noise-related injury;
 - Respiratory protection - must be used where necessary (e.g. exhaust fumes in tunnels or droplet infection in sewers).
- ¥ Safety equipment must be:
 - of approved design (i.e. meet Australian Standards as a minimum);
 - of suitable quality for the conditions to be encountered in the field;
 - inspected and maintained regularly.
- ¥ The staff member in charge of the field activity must ensure that all safety equipment has been inspected and undergone maintenance before commencing a field activity.
- ¥ Training in the use of safety equipment must be given before the field activity commences.
- ¥ Essential safety equipment:
 - Certain clothing and equipment may be considered essential for personal and group safety;
 - The staff member in charge must ensure that all participants are aware of the possible neglect of the duty of care principle should they allow a person to take part in a field activity without safety equipment where the wearing of such equipment has been advised as essential;
 - Before the field activity commences essential safety equipment must be checked to ensure that it fits correctly.
- ¥ Protective clothing and footwear:
 - It is the responsibility of individual students, members of staff and volunteers to ensure that adequate protection for the environment and conditions to be encountered is carried and used.

¥ Navigation systems:

- Maps of suitable scale and navigation systems must be provided both for the group as a whole and for vehicles or small groups working away from the main group.

8. Communication

¥ Communication must be provided between:

- groups/vehicles in the field and the main base camp;
- the main base camp and the host University or a nominated communications base;
- the main base camp and emergency services.

¥ Field personnel must make contact on a regular pre-arranged basis. It is highly recommended that daily contact be made with groups working in the field.

¥ More than one person in each group must be trained in the use of the communications equipment carried with the group.

¥ Training must be carried out before the field activity commences, which will provide a useful check as to the functioning of the equipment.

9. General Rules

¥ These general rules represent the minimum standards required of all staff and students attending VIEPS field activities.

¥ All staff and students must comply with the health and safety requirements of the host university. If you are not sure, ask your supervisor or the staff member in charge of the activity.

¥ Employees will report all accidents and incidents and promptly report all near misses that may have resulted in personal injury, property loss or harm to the environment and take immediate action to make safe the substandard condition if a hazard is identified.

¥ All vehicles are to be driven safely and in compliance with the requirements of the host university and state and federal laws.

¥ Personal protective equipment must be worn as required, checked regularly and kept in good condition.

¥ All staff and students must be capable of carrying out their work or study in an alert and efficient manner.

¥ No staff member or student will be permitted to work or study whilst under the influence of intoxicating liquor or illegal drugs. The misuse of drugs is not allowed on any VIEPS field activity.

¥ No pets or firearms are permitted on VIEPS field activities.

¥ Any staff member or student who has knowingly breached the policy, rules or procedures of the host university may face disciplinary action.

Chapter 1

Hazard Identification and Risk Assessment

All staff members are expected to contribute to the improvement of safe working practices and the elimination of hazards. The following is a list of some, **but not all**, of the hazards that are most likely to create an accident or emergency situation.

- vehicle accidents
- aircraft/helicopter
- exposure — heat stress/sunstroke and extreme cold
- heavy equipment e.g. drill rigs, bulldozers, backhoes
- missing persons
- bush fires
- floods.

You are required for each activity to carry out a risk management assessment. An example of such an assessment is provided in Appendix^oA.

If an accident happens, you must report it to your School/Departmental Safety Officer as well as to the VIEPS Office.

Chapter 2

Communication and Emergency Procedures

When working in remote areas it is imperative that you establish a base with which you communicate on a regular schedule. This Base may be a police station, a homestead, exploration office, field base, or some other responsible person who will accept responsibility of acting as your base.

RADIO/PHONE SCHEDULES PROCEDURE

Radios and satellite phones must be tested before leaving for the field.

When working/camping in remote locations a minimum of 2 scheduled calls must be made daily to your responsible person these will normally be between 8:00 - 8:30 am and 5:00 - 5:30 pm unless alternative arrangements are made. The purpose of the sched is for personnel to update their location and communicate a plan of where they will be working daily. **Switch the Radio on whenever you are in or working near the vehicle.**

Ensure that you are familiar and confident with the use of communication equipment prior to leaving for the field. When making a scheduled call give your:

- call sign
- personnel present
- brief up date of situation

Keep your messages brief and to the point; we do not have dedicated radio frequencies.

At some sites where radio coverage is poor, satellite phones are available. During transmission, satellite phones radiate microwave power from the front side of the antenna unit (the side pointed towards the satellite) **Do not stand within 1 metre of the antenna when using the phone.**

IN AUSTRALIA THE EMERGENCY NUMBER 000 WILL NOT WORK ON A SATELLITE PHONE - CALL 38 INSTEAD

Satellite phone calls are expensive. Calls should be kept brief and to the point. Satellite phones should not be used for personal calls unless prior arrangements have been made with your supervisor.

If you miss a radio or phone sched make every possible effort to get in contact as soon as possible before the next sched is due. Unnecessary searches involving police, state emergency service and civil aviation are both costly and embarrassing.

Missed Scheduled Calls

If a scheduled call is missed, the Base Office will attempt to contact the missing person every hour on the hour until the missing person is contacted. Two hours after the missed call, the supervisor or their designate will be contacted.

Eight hours after the scheduled call was missed, local aircraft and helicopter companies should be contacted and told they maybe required for an aerial search.

If there has been no contact with the missing person and the second scheduled call is missed the following response MUST be implemented.

MISSING PERSON(S) PLAN

1. Check designation map for location information.
2. Mobilise vehicle to search area. If missing person is in location remote from Base Office, contact station owner in search area to assist in search.
3. Mobilise an aerial search using aircraft or helicopter or both.
4. Contact Royal Flying Doctor Service (RFDS) and place on standby.
5. Contact State Emergency Service (SES) and place on standby.
6. Attempt to establish radio or phone contact with missing person every half hour.
7. If missing person is found/contacted and a remote area emergency reported, the following procedure must be observed. Record the following:
 - Location and time of incident
 - Nature of the incident
 - Number of casualties
 - Action undertaken by field crew
 - What future action response required by field crew
 - Any additional information
8. If missing persons not found by aerial or ground surveillance the police are to be informed. Once informed the police will take charge of the search.
9. Once missing persons are located, contact RFDS and SES and notify that emergency is over.

REMOTE AREA EMERGENCY PROCEDURES

In the case of a medical emergency the following procedures are to be followed:

1. Initial first aid to be administered.
2. Patient to be made as comfortable as possible.
3. Call the base office for assistance. If you cannot contact the base office go to step 4.
4. Dial 38 (Medical Assistance) and press send on satellite phone or use HF radio if available: make emergency radio call to nearest RFDS base in your area.

THE 000 EMERGENCY NUMBER WILL NOT WORK FROM A SATELLITE PHONE, DIAL 38 INSTEAD

RFDS HF RADIO DAYTIME OPERATING FREQUENCIES

PRIMARY FREQUENCY	5110 kHz
SECONDARY FREQUENCY	6965 kHz

RFDS HF RADIO NIGHT TIME OPERATING FREQUENCIES

PRIMARY FREQUENCY	5110 kHz
SECONDARY FREQUENCY	2020 kHz

Press the emergency call button for 30 seconds after which time you will hear a recorded announcement stating the base name and call sign. This will be repeated until the Base Operator answers your call. If you **DO NOT** hear any base announcement, the call has been unsuccessful, try again on the primary frequency.

If still unsuccessful switch to secondary frequency and repeat the procedure.

- (1) Explain situation and give coordinates of accident and those of the nearest serviceable airstrip.
- (2) All avenues of support should be utilised i.e. other vehicles, police, ambulance, helicopter etc.
- (3) Notify your supervisor or Head of School of all events and outcomes.

The Australian Outpost HF Radio Service

The Australian Outpost HF Radio Service

Keep this information handy to refer to when using your radio

The Outpost Radio Service is made up of numerous radio stations, operated by several different organisations. These provide a mantle of safety for travellers and residents in remote areas. Each station offers different facilities and hours of operation. You should always confirm available services with the stations you may wish to communicate with, before setting off into the bush. The progressive installation of telephones into most homesteads means that users of the service are now mainly operators of 4WD off road vehicles.

A Mobile Outpost Radio Licence is required for the approved radio that you intend to use in your vehicle. This may be purchased for the current price of \$26 pa across the counter at most offices of the Australian Communications Authority. No operator examination is required. Your licence will contain a 'Callsign' which you should use to identify calls made from your radio. Using the radio will be made easier if you take the trouble to learn the phonetic alphabet listed below, to spell out difficult words or names so they are not mistaken.

A Alpha	J Juliet	S Sierra
B Bravo	K Kilo	T Tango
C Charlie	L Lima	U Uniform
D Delta	M Mike	V Victor
E Echo	N November	W Whiskey
F Foxtrot	O Oscar	X X-Ray
G Golf	P Papa	Y Yankee
H Hotel	Q Quebec	Z Zulu
I India	R Romeo	

The Royal Flying Doctor Service is the oldest provider of outpost **'Flying Doctor Radio'** communications, primarily in support of RFDS medical services. Communications assistance will also be given for other problems, vehicle break downs, police matters, etc. Private Radio-Telephone (Radphone) calls can be handled by some stations, at the station operator's convenience during office hours, provided that prior arrangements have been made for billing. Each station has a choice of radio frequencies which provide ranges out to 500Km or more.

The St. John Ambulance station VJY in Darwin provides similar Emergency & Radphone services in the Top End

Penta Comstat VZX located on the NSW Central Coast is a privately operated HF station providing long range communications for Land Mobiles travelling throughout Australia and for Small Craft sailing the surrounding oceans. Emergency communications are available to all who call. Medical calls are connected to the RFDS base or medical service best placed to handle the emergency. Weather Bulletins are broadcast regularly and services for members include position reporting, messaging, Radiophone calls and SeaMail (HF email). This allows for family, friends and office to be kept informed of the whereabouts and condition of the travelling party. Phone 02 6559 1888 or Fax 02 6559 1885 for details.

Telstra Mobile Satellite and Radio Services provides a public Radphone service which is available for both Ship Stations and Land Mobiles. Phone Telstra on Freecall 1800 810 023 or Fax 1800 811 373 for pricing and a frequency schedule.

School of The Air Services may be heard where the Department of Distance Education shares common frequencies with the RFDS. Do not interrupt, except in an emergency, any station conducting a school session.

Calling Procedures for talking to Outpost Stations are not hard to learn. You should first understand how to operate your radio. Read the manufacturer's instructions and then have PCA check you out.

To Call an RFDS or St John Station
Select the primary frequency of the station you wish to call as shown in bold print on the attached map. Tune the antenna and then, if within the operating hours of the station and the channel is clear of other conversations, you should be able to voice call the station and get a reply. See the map for each station's hours of operation. To make an Emergency call outside these hours, you must use the **Emergency Alarm Call Button** on your radio. Send the alarm for at least 20 seconds. The station should answer promptly if attended, but it may take several minutes to wake the duty officer from sleep at night. If no reply, try another frequency or station.
PLEASE - ONLY Genuine Emergency calls after hours.

Penta Comstat VZX replies to **Select** (Selective Calling) on all channels and voice calls on certain frequencies. Select is the preferred method of calling as it identifies the caller. Also, it allows them to set their radio up to scan all Penta's channels silently and when Penta has a phone call or message, their radio can be paged and will ring like a telephone.

PERSONAL EMERGENCY BEACONS (EPIRB)

All staff and students should ensure that they carry Personal Emergency Beacons whenever you work or visit remote field locations in Australia or overseas.

As each beacon has a unique serial number which is recorded, do not lend or swap your beacon with other personnel as this may lead to confusion in an emergency situation.

The following procedure must be followed if you have to use the beacon. When you are issued with your beacon, familiarise yourself with the instruction manual before going out in the field.

Procedure for Use of Personal Emergency Beacon

If an emergency occurs, you should first try to use a satellite phone or your radio to summon assistance. If you have not been able to make contact, use the personal emergency beacon.

The personal emergency radio beacon is a self contained radio transmitter for emergency use. When activated it transmits an internationally recognised emergency signal for a minimum of 48 hours that can be detected up to 4000 kilometres away.

To activate the beacon, push down the yellow power switch and slide the power switch across the top of the beacon, then fully extend the antenna. An internal beeper will sound when the beacon is switched on.

The beacon should be placed on the ground so the antenna is in a vertical position. Select a location which is clear so the signal is not obstructed by trees, rocks or other objects.

Once the beacon is activated leave it switched on. A continuous signal is required to locate the beacon.

Each beacon should be tested every three months to ensure it is in working order. To test the beacon, insert the tip of a ball point pen into the test button hole (do not force). If the test indicator light flashes red and there is an audible beep, this indicates that the beacon is functional. If the indicator light does not flash and there is no beep, the battery needs replacing.

The beacon is not to be operated except in an emergency. **Deliberate misuse may incur a severe and costly penalty.**

Chapter 3

Personal Safety and Survival

These procedures apply if anyone is lost (on foot or in a vehicle), or is stranded in an isolated area. None of these situations are dangerous if handled sensibly, but panic and foolish reactions increase the dangers from these hazards.

In An Emergency



DO NOT PANIC

Stop Think Observe Plan

STOP - Take a deep breath, sit down if possible, calm yourself and recognise that whatever has happened to get you here is past and cannot be undone. You are now in a survival situation and that means . . .

THINK - Your most important asset is your brain. Use it! Don't Panic! Think first, so you have no regrets. Move with deliberate care. Take no action, even a foot step, until you have thought it through . . .

OBSERVE - Take a look around you. Assess your situation and options. Take stock of your supplies, equipment, surroundings and the capabilities of fellow survivors . . .

PLAN - Prioritize your immediate needs and develop a plan to systematically deal with the emergency. Make a plan. Follow your plan. Adjust your plan only as necessary to deal with changing circumstances.

PRIORITIES:

1. Medical Care
2. Shelter & Fire
3. Signalling & Communication
4. Sustenance

Procedure if Lost

If you think you are lost it is pointless pushing on. **STOP!** It is safer to retrace your steps to a point where you can establish your location. **Don't panic.**

If in a Vehicle

STOP. Stay with the vehicle, it is a source of shelter, has your supplies and equipment and is easier for search parties to see. If you have to leave the vehicle temporarily in search of food or water, mark your trail on the ground with sticks or stones so that you can find your back. When calling for help use your radio first or sat phone.

If on Foot

Once you decide you are lost **STOP.** Consult your map or air photo, if you have one, to try to identify a feature. Take a fix with your GPS to locate yourself. Consider retracing your route to your last known position; or you can make for higher ground in an attempt to fix your position. If you cannot fix your position, set up camp in the shade and stay put. As long as you have notified your Responsible Person where you are going, a search party will be looking for you.

Forced Landing - Stay with the Plane

STOP. Don't travel unless you are absolutely positive about where you are going. Even if you saw a road or building just over the ridge on your way down, don't try to walk out unless you are sure you know how to get there, through possibly inhospitable terrain. You also need to be sure that your physical condition and equipment are good enough to ensure you can make it. Generally, the only reason to travel is if rescue is extremely unlikely and you have absolutely no other alternatives.

EMERGENCY POSITIONING INDICATING RADIO BEACONS (EPIRBs)

Personal **EPIRBs** are issued to all staff and students working in remote areas. These beacons when activated in an emergency situation allow rescuers to locate you fairly quickly. **They are only to be used in a life threatening situation** and as a last resort after all other avenues of communication have been tried. For instructions on use see Chapter 2.

EMERGENCY SIGNALLING

The following advice on signalling may be followed in any emergency.

Signals must stand out against the existing background to be noticed. As the target of a search, you must make yourself as visible as possible. Employ any and all possible methods that are safe and appropriate.

The more you can do to attract attention to yourself, the more likely someone will notice and come to your rescue. A signal mirror is the best all round signalling device. It can be seen for up to 80 kilometres. If you don't have a mirror at hand, it is easy to improvise one from any piece of metal (polish it with fine sand or dirt), foil or any shiny object like a credit card (particularly one with a hologram on it). A mirror 10cm by 15cm is ideal, but a smaller one will work nearly as well.

Signalling with a Mirror

The flash of a mirror or other shiny surface can be seen for kilometres, even on a dull day.

DO NOT sustain a flash signal onto a nearby aircraft because the signal might momentarily blind the pilot.

To use a signal mirror you must:

- hold the mirror under your sighting eye
- extend your other arm outwards and form a V with two fingers
- sight the aircraft or object in the point of the V
- tilt the mirror under your eye so that the sun's reflection passes through the V in the direction of the aircraft. Flash the reflection onto your target.

Signalling with Fire and Smoke

Fire is most noticeable during the night. Smoke is most noticeable during daylight.

- One good fire is better than several small ones.
- Have signal fires ready (plus smoke producing material) but unlit, so that you do not waste fuel and energy. Light the fire when you hear an aircraft.
- A single isolated tree may be set alight to attract attention.

Be very careful to not start a bushfire or endanger yourself.

Noise Signals

Noise signals can attract attention. The repetition of three sounds in a row is recognised as a distress signal. Leave at least 5 seconds between each sound and at least 15 seconds between each series of sounds.

Flares

Several kinds of flares exist for use in the field. Care must be taken when using flares.

Always follow the instructions printed on the flares.

Other Signals

Ground signals are an effective means to attract attention. Contrast is the key to ground signals. Size, angularity and motion all help attract attention. For ground signals, forget complicated symbology, just make a large "V" for immediate assistance or "X" if medical assistance is needed. "SOS" will work, but it is a lot more effort. Use brightly coloured materials, brush, branches, rocks, logs, clear away ground cover to the dirt, stomp down the snow or otherwise create contrast and shadows.

EMERGENCY SIGNALS

~	Proceed in this direction
Y	Yes
N	No
X	Require Medical Attention
V	Require Assistance
SOS	Help

WATER

Thirst is a very poor indicator of your state of hydration, especially in cold weather. Don't rely on it. Try to drink at least four to six litres of water daily, more in hot and arid climates. Take drink breaks at hourly intervals and force yourself to drink if necessary. Dark coloured urine is the most reliable indication of significant dehydration. The effects of dehydration, even mild dehydration, are insidious and extremely dangerous in a survival situation.

RATION SWEAT, NOT WATER!

Always carry plenty of water. Water is of critical importance. Ten litres of water, if carefully rationed, should ensure survival for at least three days in the hottest part of summer, provided you are completely inactive and resting in the shade.

Personal water bottles must be carried when working in the field away from the vehicle.

Water Purity

Do not drink salty water.

Water can be purified in a number of ways:

- By using water purification tablets and allowing the water to stand for 30 minutes.
- By adding five to ten drops of iodine per litre. See table below.
- By adding a few grains of potassium permanganate (Condy's crystals) to one litre of water and allowing it to stand for 30 minutes.

Boiling is by far the most reliable method to make water of uncertain purity safe for drinking. Water should be brought to a vigorous rolling boil for several minutes and allowed to cool to room temperature - do not add ice. Adding a pinch of salt to each litre, or pouring the water several times from one container to another will improve the taste.

Treatment of Water with Tincture of Iodine

Tincture of iodine (from medicine chest or first aid kit)	Drops* to be added per litre	
	Clear water	Cold or cloudy water
2%	5	10
*1 drop = 0.05 ml. Let stand for 30 minutes. Water is safe to use. Cloudy or very cold water will require prolonged contact time; let stand up to several hours prior to use, if possible.		

Dirty water should only be consumed after it has been boiled and strained through a piece of rag. Remember that even a slight infection or sickness in a survival situation could be fatal.

The following describes three methods of obtaining drinking water if supplies are low.

Vegetation Still

Materials required: large plastic bags, tape.

Place a large clear plastic bag over the leafy branch of a non-poisonous tree. Tape the mouth of the bag around the branch so that no water vapour can escape. The sun's heat will evaporate water from the leaves, which will condense in the bottom of the bag. Simply cut a small hole at the bottom of the bag to draw off the water. **Don't forget to reseal the hole.** Drawing off the water every four hours will ensure that the still continues to work.

Desert (Solar) Still

Be careful, as this method requires effort, which means a loss of body fluids.

Materials required: Two containers, plastic sheeting and tubing.

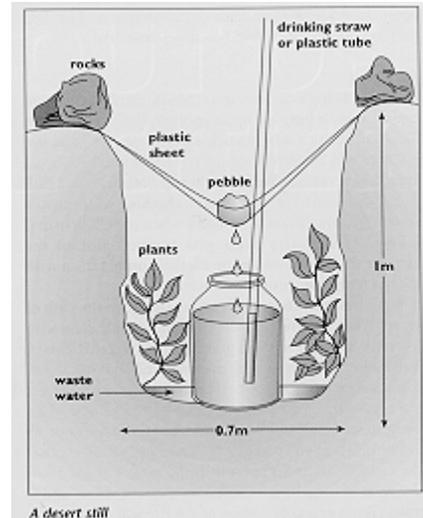
Dig a hole approximately 60 cm deep by 1m square. Line the hole with leafy vegetation (non-poisonous), place a container in the centre of the hole with a long drinking straw in the container running out of the hole (see heading **Survival Kit**). Cover the hole with a clear plastic sheet (space blanket if nothing else) and seal around the edges with the soil from the hole. The plastic sheet should be weighed down with a

stone in the centre so that it forms an inverted cone. This will allow the condensed water to run to the centre of the under side of the plastic and drip into the correctly placed container.

Hints:

- The drinking straw saves having to lift the plastic to recover the water.
- Replace the foliage when the water production drops off.
- The plastic should not touch the foliage - otherwise the water will run back down the foliage.
- Urine, salty water (Do not use radiator water) may be added to the hole.
- Pig-face is particularly good in a still and will produce a good quantity of water quickly if crushed when placed in the hole.

A desert still

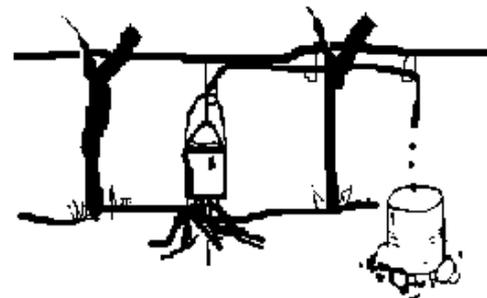


Salt Water Still

Materials required: Two containers, Alfoil, tubing, wire.

Use a container such as a **Billy** Fill it with salty water. Seal off the container by folding alfoil or something similar into a cone shape and taping (wiring) the large end securely around the top of the container. Push one end of the tubing into the top of the cone. Seal around the tubing. Place the **Billy** over a fire and bring it to the boil. The steam will rise through the tubing and condense. Collect the drips in the second efficient container. The condensing will be much more efficient if you run the tubing through a cooling agent, e.g. water

Distilling Salt Water



Chapter 4

Vehicles

More fatalities, accidents and serious injuries occur with motor vehicles than with any other equipment encountered in the field. Using the following guidelines and safe working procedures will help to eliminate vehicle-related accidents. It is important that staff and students operate vehicles and equipment correctly and are familiar with the performance limits of vehicles and equipment. You should endeavour to develop safe driving skills through defensive driving techniques and safe driving attitudes.

GENERAL RULES

- **School/Departmental vehicles must be driven only by properly licensed and trained staff and students.**
- You must report any instance of dangerous driving to your School/Department Head.
- **Never drive a university vehicle if you have consumed alcohol or if you have taken medication or drugs that might affect you.**
- Most accidents result from driving too fast for existing road conditions. You must reduce speed if road conditions are unknown, if they deteriorate, or if visibility is reduced, no matter what the legal speed limit.
- **Belt up and live!** Every occupant of a university or rental vehicle must wear a properly fastened seat belt while the vehicle is moving, whether the vehicle is on or off road.
- Do not transport passengers in the back of pick-up or tray-back vehicles.
- **Respect and obey the legal speed limit at all times.**
- Wherever possible, use existing roads or tracks. Do not create any unnecessary new tracks with your vehicle. **Preserve and respect the environment.**
- Smoking in university vehicles is not permitted.
- Regular inspections must be carried out to ensure university vehicles are maintained in a roadworthy condition.
- Do not pick-up or give a lift to hitch hikers.

PROCEDURE FOR INSPECTIONS AND MAINTENANCE OF VEHICLES

Daily Check

Mechanical breakdowns can be minimised by frequent inspections and regular maintenance. Prior to starting the vehicle check the condition of the tyres, ensure the windscreen is clean and secure or remove loose objects from the cab.

All field vehicles will be kept and maintained in an excellent road worthy condition. As a minimum, vehicle checks should be carried out weekly, however, if the vehicle is used in off road or harsh conditions, more frequent checks should be done.

RISK ASSESSMENT CHART				
Potential Severity of Consequences	High	A	A	A
	Moderate	B	B	B
	Low	C	C	C
		Low	Moderate	High
		Probability of Recurrence		
	Complete Investigation Required			

HAZARD RATING *VEHICLE INSPECTION FORM*

" A " A condition or practice likely to cause permanent disability, loss of life or body part, and/or extensive loss of structure, equipment or material.

" B " A condition or practice likely to cause serious injury or illness resulting in temporary disability or property damage, but less severe than class "A".

" C " A condition or practice likely to cause minor (non disabling) injury or illness or non disruptive property damage.

Odometer:

Next Service

All outstanding actions must be transferred to a Action Planning Form

	Accep- table	Unacce- ptable	N/A	Hazard Rating	Fixed	Comments
VEHICLE REGO NUMBER						
OIL LEVEL						
BRAKE FLUID LEVEL						
CLUTCH FLUID LEVEL						
ENGINE COOLANT LEVEL						
AIR FILTER						
POWERSTEERING FLUID LEVEL						
WINDSCREEN WASHER						
BATTERY (WATER LEVEL)						
DRIVE BELTS						
FUEL/FUEL CAPS						
LIGHTS (FRONT/REAR)						
BRAKES						
FIRE EXTINGUISHER (CHARGED)						
GAUGES (OR WARNING LIGHTS)						
TIRE INFLATION / WHEELNUTS						
TOOLS(JACK,BRACE ETC)						
SPARE TYRE/S						
FIRST AID KIT (COMPLETE)						
UHF RADIO						
SPARE KEYS (CAR & LOCKS)						
OFFICE & STATION CALL NO'S						
BUSH SURVIVAL BOOK						
LOOSE OBJECTS						
WINCH AND CONTROL						
CLEAN UNDERNEATH						
GENERAL CLEANLINESS						

COMPANY	NAME	DATE	SIGNATURE
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Off Road Checks

The following checks should be carried out on vehicles which are constantly used off road.

Keep a watch on the warning gauges, do daily checks of fuel, oil, and water, and check the tension and condition of the fan belt.

When travelling over corrugated or rough terrain, check the tightness of wheel nuts.

In grassed areas, and especially in spinifex, avoid the risk of vehicle fire by checking the exhaust system frequently. When grass or seeds are caught on or around the exhaust there is sufficient heat for ignition.

Regularly inspect and clean the radiator of grass seeds to prevent over heating.

Get under the hood and under the vehicle itself and check for water leaks, oil leaks, fuel line leaks, the movement of parts that should not move, cracks, loose components, chafing brake or fuel or radiator hoses and anything else that seems abnormal.

Tyres should be inspected for stakes and cuts, which may cause a blow-out at high speed.

GUIDELINES FOR SAFE DRIVING

- **Drive at a safe speed.** Always reduce your speed when you encounter adverse road conditions including heavy traffic, hazardous road surfaces (e.g. water, sand, oil, ice, snow, wet leaves, potholes, mud, ruts), bad weather and poor light or visibility.
- **Drive at a speed, which will allow you to stop** the vehicle safely after observing an unexpected danger.
- **Stationary vehicles and livestock are a major hazard** when driving through a dust cloud. You should drive sufficiently slowly so that you can stop or drive around any such obstructions.
- **Respect the 2 second rule** for safe following distance. Under normal conditions, allow the vehicle ahead of you to pass a fixed point two seconds before you pass that same point. Increase this following distance whenever you experience adverse conditions, or when you tow a trailer.
- Always be ready to yield the right of way to another vehicle to avoid a collision. **Aggressive driving attitudes often cause accidents.**
- **Anticipate possible problems** by scanning well ahead and behind your vehicle. Once you identify a hazard, take proper preventative action. Don't have a "wait and see" attitude.
- **Avoid driving at night.** Reduced visibility while driving at night makes it difficult to see animals or pedestrians on the road. Try to minimise night driving whenever possible. **Note some sites have a no night driving policy.**
- **Never drive for more than 9 hours a day.** Take several breaks during this period. Once you begin to notice fatigue, it has already reached an acute stage. Rotate drivers or pull off the road at a safe place and rest. For travel on the open road plan your journey to avoid driving at night. You can reduce travel fatigue on a long trip by taking frequent short breaks; have a **Driver reviver** stop at least every two hours.
- **Know how to reach your destination.** Be able to reach your destination without having to closely follow another company vehicle.
- **Be attentive.** Keep your eyes moving so that you don't develop a fixed stare.
- **Park your vehicle** in a safe place when you stop by the side of the road. Park well off the road on a straight stretch away from curves, hills, and intersections.
- **Switch on your headlights** in areas of poor visibility, (dust, fog, rain, smoke and twilight) your vehicle will be much easier to see by other drivers.
- **Livestock.** Cattle, sheep and kangaroos are a particular hazard at dusk and may suddenly run into your path from the bush at the side of the road. Do not swerve to avoid them. You should brake in a straight line to avoid a roll over.

GUIDELINES FOR OFF ROAD DRIVING

- Make sure that you are in a comfortable driving position and regulate your speed to suit the visibility and surface conditions. You should get out of the vehicle and walk across any creek crossing or rocky area that looks difficult. Remember a damaged vehicle can cause an accident.
- Anticipate steering wheel kickback when you drive over rough terrain. Keep your fingers and thumbs firmly placed on the outside of the steering wheel and your hands in the "ten-to-two" position.

- If you are working in desert areas, expect sand. Carry a shovel and strong steel bar in the vehicle to anchor your winch in case there are no trees. (You can also bury a spare tyre to anchor your winch.)
- Bulldust can cause damage if sucked into engines or when it builds up around greasy engine components. Even more dangerous is the badly damaged road surface below the deceptively smooth dust. Drive slowly through bulldust patches to avoid raising the dust, damaging the undercarriage and choking the air filter.
- Beware of slippery muddy conditions, particularly during the rainy season. Tyre chains can help to provide traction.
- Avoid parking in dry stream beds if there is any possibility of flash flooding.
- Watch out for livestock and wildlife, especially on bush roads and remote highways. (Cattle, camels, kangaroos, etc.)
- To avoid the possibility of starting a grass fire from hot engine parts avoid parking in tall dry grass. Regularly clear away dry grass and vegetation from sump and exhaust guards.
- Check the under side of the vehicle at the end of each period of bush driving. When you reach the first stretch of graded road remove any sticks caught underneath.
- When driving off road, drive straight up and down slopes. Do not drive horizontally across slopes.

GUIDELINES FOR COLD WEATHER DRIVING

- Make sure there is antifreeze (ethylene glycol) in the vehicle radiator.
- If the vehicle has been stationary, completely clear your vehicle windshield and all lights of snow and ice.
- When driving in fog or blowing snow, use your headlights on low beam for less reflection and better visibility.
- Always be able to come to a full stop within the distance you can see.
- On snow-packed or icy roads, accelerate and brake gently to avoid skids.
- Remember that bridges and overpasses ice-up before ice forms on the rest of the road.

GUIDELINES FOR HOT WEATHER DRIVING

- After a long hot drive, idle the engine for one minute before turning off the ignition.
- Watch the temperature gauge in hot weather as the engine may overheat, especially if you are going uphill frequently.

If overheating occurs:

1. Turn off the air conditioning and pull off the road in a safe place.
2. Stop the engine if the engine coolant is boiling over.
3. Leave the engine running if the coolant is not boiling over.
4. Turning on the heater will help cool the engine.
5. Do not remove the radiator cap when the engine and radiator are hot.
6. If the engine is running too hot, check for leaks in the cooling system and check for broken fan belts. Check the radiator cooling fins are not clogged with grass seeds.
7. Turn off the engine immediately if you discover any broken belts.
8. Check coolant levels when the temperature returns to normal. Refill if necessary.

PROCEDURE FOR DRIVING RENTAL OR LEASED VEHICLES

If you drive a rental or leased vehicle your name and driver's licence number must appear on the hire document. Carry out the inspection procedures on rental or leased vehicles that are used for field work.

PROCEDURE IN CASE OF ACCIDENT

If you are involved in a road accident, record all the relevant facts on the spot. They will be needed to fill in an insurance claim form and may be used in any action to recover repair costs. The following checklist should be followed.

1. Date and time of accident.
2. Address/location at which the accident occurred.
3. Was the roadway wet or dry.
4. Width of roadway.
5. Was your vehicle on the correct side of the road.
6. Distance of your car from curb.
7. Estimated speed at time of impact - your vehicle; other vehicle.
8. Estimated speed at 50 metres before impact - your vehicle; other vehicle.
9. If after sundown, was the accident site well lit.
10. What lamps were alight on your vehicle and on the other vehicle.

Other Vehicle

1. Driver's name, address and licence number.
2. If different, owner's name and address.
3. Make, model and registration number.
4. Registration expiry date.
5. Extent of damage.
6. Was the vehicle already damaged before this accident.
7. Name of insurance company and type of policy.

Police Involvement

1. If police are called, names of attending officers and their police station.
2. Was the other driver breathalysed? If so, what was the reading.
3. Did the police lay blame or mention charge.

General

1. Names and addresses of witnesses.
2. Names and addresses of injured persons, and degree of injuries.
3. Damage to property other than vehicles.
4. Name and address of owner of property damaged.
5. Did the other driver admit liability - record exact words.
6. **If police are not called, report accident to a police station within 24 hours.**

PROCEDURE FOR JACKING AND WHEEL CHANGING

The safest method of jacking a vehicle is to use the standard hydraulic bottle jack that comes with the vehicle. Never crawl under a jacked-up vehicle for any reason unless it is also supported stably on blocks (or on level ground).

Jacking Procedure Using a Bottle Jack

1. Park the vehicle on a firm and level surface.
2. Engage first gear and apply the hand brake.
3. Place a chock ahead and behind the wheel diagonally opposite to the wheel to be changed.
4. Remove wheel-changing gear (jack, wheel nut spanner) from the vehicle.
5. Check that the spare wheel is serviceable, and place it near the wheel to be changed.
6. Place the jack in a stable position underneath the vehicle in the vehicle manufacturers recommended jacking position.
7. Raise the jack to just take the weight of the vehicle.
8. Slacken off wheel nuts so they can be turned by hand.
9. Jack the vehicle high enough so that the spare can be fitted.
10. Remove all wheel nuts, and take off the wheel.
11. Fit the spare wheel to the studs, using the wheel spanner as a lever if necessary.
12. Screw on all the wheel nuts, first finger-tight, checking that the nuts are correctly centred, then tighten the nuts with the wheel spanner.
13. Lower the jack, pull it out from under the vehicle, and tighten all wheel nuts with the wheel spanner. Then check that the nuts are tight, going completely around the wheel.
14. Place the wheel removed in the spare wheel position.
15. Remove chocks, wind the jack completely down and place the jack and tools in their proper storage place.
16. Check the area for any items, which may be left behind. Resume travel.
17. Have the defective wheel repaired ASAP and check wheel nut tightness regularly.
18. Check all wheel nuts once the vehicle has been lowered. Exercise common sense when tightening wheel nuts. Over tightening can result in studs breaking off. Too loose, and you cause damage to the rim which will result in the wheel being damaged and possibly falling off.

Procedure for Using a Kangaroo or Highlift Jack

**Kangaroo or Highlift Jacks are Potentially Dangerous
Incorrect Operation may Result in Serious Injury**

It is recommended that a bottle jack be used as a first preference if jacking on a flat surface.

If you do not know how to use a Highlift Jack ask someone that does. Do not experiment.

1. Do not jack a fully laden vehicle.
2. Ensure the hand brake is on.
3. Chock wheels.
4. Ensure jack has a firm footing preferably on a wooden block.
5. Clean and lubricate the jacking mechanism.
6. Ensure the jacking mechanism has free movement before using.
7. Use only the marked jacking points on the vehicle.
8. Place foot of jack in jack point and lever slowly.
9. Move the lever to the side of the body and **NOT** under the chin.
10. Do not place hand on jack upright whilst jacking as there is potential to jam fingers.
11. Ensure vehicle raises vertically and jack does not slip, if it does lower jack and immediately repeat procedure.

PROCEDURE FOR TYRE REPAIRS

Equipment required is a tarpaulin at least two metres square, tyre levers, a tyre pressure gauge, valve core removing key, chalk or a felt pen, bead breaker, rubber-headed hammer, puncture repair kit, pump, rim restraint straps, and a container of water. The repair should be carried out in a level area, on the tarpaulin, so that the tube remains clean and tools are not lost.

The stages are:

1. Clean excess dust from the tyre, and remove any stones in the tread. Remove the valve cap and core and mark the position of the valve stem on the tyre wall with chalk or felt pen.
2. Break the bead seal on both sides of the tyre, using the bead breaker.
3. Remove the split rim, push the valve stem in and take the tyre and tube off the rim.
4. Remove the tube and rubber flap from the rim.
5. Inspect the tube for holes and splits and mark these, then repair them with the puncture repair kit.
6. Replace the valve core and partially inflate the tube, then test for further leaks in water.
7. Deflate the tube, and then repair any further leaks with the puncture repair kit. Repeat stage 6 to make sure all leaks have been repaired.
8. Check the inside and outside of the tyre (particularly in the points where the leaks were found) for the cause(s) of the punctures. Remove the cause and repair the tyre.
9. Clean all debris from the inside of the tyre, put the tube in the tyre, replace the rubber flap, and put the tyre on the rim using the valve mark on the tyre to get it back in its original place.
10. Refit the split rim on to the wheel, with the split opposite the valve stem, put on the rim restraint straps and partially inflate the tube. Ensure that the bead is setting correctly on the rim.
11. Inflate the tyre to the correct pressure, using the pressure gauge (use 40 psi if in doubt).
12. Return the wheel to its correct place and put away all tools.

Split rims can kill. Never attempt to fully inflate a tyre with a split rim without restraints in place.

GUIDELINES FOR VEHICLE RECOVERY OPERATIONS

It is best practice to avoid those situations that may lead to you having to recover a vehicle that is stuck.

Park the vehicle well clear of any problem area and walk across the boggy, steep or rough section.

After inspecting the problem area, consider these questions.

- Can the vehicle do the job?
- Can the driver do the job?
- Does the job have to be done?

If the answer to any of the three questions is 'no', then avoid the problem area and find another route. However, if for whatever reason the vehicle is or becomes stuck, then recovery procedures are required.

In a boggy area, or where there is no wheel traction (e.g. the body is resting on uneven ground), some combination of jacking and packing under the wheels, and/or winching with the portable (Tirfor) or vehicle-mounted winch, will be required.

Careless winch operation can result in serious injury or property damage. Read and understand all safety precautions and operating instructions before operating the winch.

Guideline for Recovery by Jacking

Recovery by jacking requires a shovel, mattock or pick, possibly an axe, a jack and a solid timber base plate, and some timber or stones to pack into the wheel ruts. The procedure is:

- Place the vehicle in low gear with the hand brake on.
- Dig away the mud or soil beside and in front of the bogged wheels to minimise resistance to forward movement.
- Lift the vehicle using the jack, placing the base of the jack on a level timber base plate.
- Fill in the wheel ruts with timber or stones, and then lower the jack.
- Let down the jack completely, replace it and the other tools in the vehicle, and then travel on.

Procedure for Using Snatch Strap

An alternative to winching, but only for lightly bogged vehicles, is to use a Snatch Strap. In practice, the strap is attached between the towing and bogged vehicles: the towing vehicle backs toward the stuck vehicle for about one-third the length of the strap and then accelerates away. The strap stretches under tension, thus increasing the energy being applied to the bogged vehicle.

Warning: Snatch Straps can kill if used with a poor quality towbar or if connected to towing hooks, bullbars and towbars that are not secured with quality, high-tensile bolts. People have been killed as the hooks, and even complete bull bar assemblies have become projectiles and gone through windscreens or toward onlookers.

Procedure for Recovery by Vehicle Winch

Careless winch operation can result in serious injury or property damage. Read and understand all safety precautions and operating instructions before operating the winch.

Winches are hazardous to use, must be well maintained and must be fitted to a vehicle only in an approved position and secured with rated high tensile bolts. In winching systems, a weak link is built in so that it will break before something expensive does: this is the brass or alloy shear pin, designed to shear when stress gets to a certain level. Do not replace it with a bolt. Carry several spare shear pins.

Recovery by winching requires gloves, a winch and wire rope, about 1.5 m length of chain with a large link at each end, bow shackles, a tree protector strap, a snatch block, spare winch shear pins and tools to replace these pins. Gloves should be worn when handling wire ropes.

If a tree is used as an anchor ensure that the trunk is not rotted. Attach a cable to living trees only after first wrapping a tree protector strap around the trunk. Any other form of attachment will ring bark the tree and kill it.

Keep all onlookers well distant from an operating winch line. A laden 4wd (about 2.5 tonnes) stuck in clay on a slight gradient may require over 5 tonnes strain to extract it, thus, a lot of force is applied to a winch cable, and if it breaks, it whips through the air and will sever limbs or kill.

The winching procedure is:

- First dig away the soil or mud beside and in front of the wheels. If necessary jack up the vehicle and pack under the wheels to clear any solid obstruction to forward travel.
- Do not have the remote control lead plugged into the winch while free spooling, rigging, or sitting idle. Have the remote control lead plugged in only during the actual winching operation.
- Never handle the wire rope or rigging while anyone else is at the control switch or during the winching operation.
- Never touch rope or hook while they are in tension or under load.
- Always stand clear of the wire rope and load during the winching operation. If a wire rope pulls loose or breaks under load, it can lash back with tremendous force.
- Always be certain that the anchor you intend to use is capable of withstanding the load.
- Always use a choker chain, wire choker rope, or tree trunk protector on the anchor.
- Never put the winch wire rope around an object and hook back to it; this will cause damage to wire rope.
- Never winch with less than five wraps of wire around the winch drum. With fewer wraps the wire rope could break loose from the drum under heavy load.
- Always unspool as much wire rope as possible when preparing rigging.

- Double line with a snatch block or pick an anchor as far away as practical. This will minimise wire rope damage, such as mashing and kinking, caused from top layers pulling down into the bottom layers when short pulls are made.
- Always pull as straight as possible to minimise the build-up of wire rope on only one end of the drum.
- Always inspect and carefully rewind the wire rope after use. Advise your supervisor if any damage to wire is observed.
- Always wear heavy leather gloves when handling wire rope. Do not let the wire rope slip through your hands.
- When anchoring the pulling vehicle, apply the parking brake and chock the wheels. Place automatic and manual transmission in neutral.
- Increase the vehicle engine idle speed if using an electric winch; this slows the flattening of the battery.
- When retrieving or spooling in wire rope, be sure to distribute the wire rope evenly and tightly on the drum. This prevents the top layers of wire rope from being drawn into the bottom layers and creating a bind.
- Always release the switch when the hook is a minimum of 1.5m from the fairlead.
- If your winch is equipped with a clutch, unplug the remote control lead, release the clutch and rotate the drum by hand to retrieve the remainder of the wire rope. Re-engage the clutch.
- If your winch is not equipped with a clutch, place the hook on a suitable spot on the mounting kit. Then, keeping your hands completely clear of the hook, the wire rope, and the fairlead, jog the switch intermittently to take up the slack. Do not over-tighten or damage may occur to the wire rope.

Snatch Block

This is a pulley through which the winch cable is run to double the winch's effective power. Use pulleys, the largest diameter available. They create the least flexing stress on the wire rope or cable wrapped around them.

On no account winch with a snatch block in combination with a Snatch Strap.

USING SNATCH BLOCKS

Snatch Block

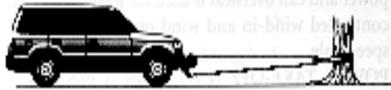
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Single line pull



Two-part line



Uses one snatch block:
doubles the force, but halves the winching speed

Three-part line



Uses two snatch blocks:
triples the pulling force, but has only one-third the winching speed

Four-part line



Uses either three single snatch blocks, or one single and one double sheave block:
gives slow winching, high power

PROCEDURE FOR WATER CROSSING

Before entering the water decide on a plan of action. Make certain the passengers know what to do if something goes wrong.

To determine if the water level is rising, falling, or stationary in a flooded creek, place a stick at the stream edge and observe the ebb and flow at that point. You can then estimate if a safe crossing will be possible within a reasonable length of time.

1. Be cautious when you cross streams. Check both upstream and down stream for some distance to determine if there is a better place to cross. Get out of your vehicle and walk across to check the water depth, firmness of the stream bed and for hidden hazards. Creeks in northern Australia may be inhabited by crocodiles, in which case do not check the water depth by wading across. Where possible, choose an alternative route and do not enter the water either in or out of your vehicle.
2. If the water is too deep for a safe crossing (above tyre height), look for an alternative route. If none is available wrap the front of the vehicle with a ground sheet before entering the creek. This will prevent water flowing back around the radiator and drowning the engine. You may need to disconnect the fan to reduce the risk of radiator damage.
3. If the car has central locking, make sure it is **not** engaged and that the windows are wound down, if the car stalls and the electrics short or fail, you will be trapped inside.
4. Lock in the hubs and select 4wd low second gear, then enter the water slowly and proceed at a constant speed. Do not slip the clutch or attempt to change gear as this will lead to a continuously slipping clutch and possibly stop the vehicle.
5. If the exit is steep or soft or both, keep going by gunning the engine once clear of the water until higher ground is reached.
6. If the vehicle stalls in the water and you cannot immediately restart it, stop trying. You will have to winch or be towed out.

Chapter 5

Small Water Craft

SAFETY PRINCIPLES

An engine failure, even a few hundred metres offshore, in a strong wind may prove fatal since once a boat drifts out of sight of the shore there is almost no hope of locating it again. Therefore in the event of boat operations being approved the following safety rules are strictly enforced for operations at the continental stations:

- ¥ All personnel operating in small boats in Antarctica must wear immersion suits. Divers will be wearing appropriate diving suits.
- ¥ Each individual boat operation is to be specifically authorised by the OIC, and then only in consultation with the senior weather observer and noting the tides and currents.
- ¥ No voyage is to be undertaken that necessitates being at sea later than one hour before sunset.
- ¥ Except in emergency circumstances boat operations are to be undertaken in fine and clear weather with calm or slight wind. The boat speed and wind speed added together, with spray, can quickly make conditions unbearable. Operations in higher wind speed should only be undertaken at the discretion of an experienced operator.
- ¥ Before each boat journey, engines are to be thoroughly checked and test run for at least five minutes. If any rough or intermittent running or any other fault is observed the defect has to be located and remedied, and a further five minute test run conducted before proceeding.
- ¥ Fuel and oil are to be checked and filled before each trip. Use fresh, clean fuel and carry spare. Plan to arrive back at the station with at least 25% of your fuel remaining. If you have doubts about having sufficient fuel a slower speed is most economical.
- ¥ On each occasion on which a boat is taken out one member of the crew is designated captain and is to have complete authority over all other members of the crew.
- ¥ Radio skeds are to be maintained with a shore base.
- ¥ A boat is never taken out with a crew of less than two, and always with sufficient manpower to propel the boat by oars in calm waters. It will be impossible to row an inflatable in even a moderate breeze.
- ¥ Load cargo evenly and do not overload. Stay seated at all times and avoid any unnecessary movement in the boat.
- ¥ Avoid starting a fire: do not smoke.
- ¥ Always know the location of the nearest safe landing and sheltered water. No matter what you may be engaged upon, if the engine fails use your back-up engine and head for the landing. Head for the shore at the first sign of a change in weather, or when Killer whales or Leopard seals are seen nearby.
- ¥ Do not tie up on an ice floe, it may be drifting seaward quicker than is obvious. Avoid close approaches to icebergs as they may collapse or turn over without warning.

The minimum equipment for any boat operation:

- ¥ two days rations per person
- ¥ container of fresh water
- ¥ waterproof clothing
- ¥ sea anchor
- ¥ spare bung
- ¥ marine distress signals
- ¥ signal mirror
- ¥ oars and rowlocks (tied to boat)

- ¥ anchor and an adequate length of rope
- ¥ bailer
- ¥ matches
- ¥ compass and map
- ¥ cooking stove, fuel and metatabs
- ¥ bivvy bag per person
- ¥ sleeping bag per person in waterproof wrapping
- ¥ extra clothes per person in waterproof wrapping
- ¥ field radio

If you are not accompanied by a second boat, a spare outboard engine of low horsepower should be carried as a reserve.

<i>Beaufort Scale of Wind Force</i>			
Beaufort scale number	km/hr	Description	Open sea state
0	0	calm	mirror-like
1	1-5	light air	glassy calm
<u>2 (limit of boating)</u>	<u>6-11</u>	<u>slight breeze</u>	<u>rippled</u>
3	12-19	gentle breeze	wavelets
4	20-28	moderate breeze	light sea
5	28-29	fresh breeze	moderate seas

BOATING EMERGENCIES

Power Failure

1. Deploy sea anchor or a substitute (e.g. ventile on rope).
2. Alert shore party using radio (or an arm waving signal) and maintain contact.
3. Determine cause and remedy of power failure if possible.
4. Recover sea anchor.
5. Use reserve motor or seek a tow from the other boat and head straight to base.
6. If everything fails row to the closest shore.
7. If you are still in difficulty, signal with smoke flares in daylight and parachute flares when dark. Neither are visible in fog. Make noises for signals in reduced visibility.

Bad Weather

1. Head for base or shore at the first sign of bad weather.
2. Radio base of your intentions.
3. If unable to make headway then consider
 - taking an indirect route to shore
 - hauling your boat onto or seeking shelter behind an ice floe (which may be drifting) or taking the calculated risk of sheltering behind an iceberg (risk of toppling)
 - shutting engine to conserve fuel until better weather.
4. If overtaken by dangerous seas in open water head into the wind for as long as possible and then deploy sea anchor.

Sinking

1. Check bung is in place.
2. Bail and notify base by radio.
3. Breached hull: block the hole with jackets, rags or anything available.
4. If swamping due to bad weather head in a direction that minimises the ingress of water, consistent with your need to seek shelter.

Man Overboard

1. One person must watch the person overboard, or drop a marker immediately.
2. Approach from downwind and turn the motor off.

Fire

1. Don't panic and abandon the boat. The risk of an explosion is negligible.
2. Smother the flames with sleeping bag, jacket, etc.

Outboard Engine Problems and Causes

¥ Engine will not start

- *Primer bulb does not become firm when pumped* — fuel tank empty; fuel line reversed; fuel connections not secure; fuel lines pinched, kinked or broken; tank vent closed; defective primer.
- *Primer bulb hard, but no fuel at carburettor* — clogged filter; fuel-line valve not opening; defective primer.
- *Fuel in carburettor but plugs stay dry* — choke not closing; idling jet shut; defective reed valve.
- *Plugs wet with petrol* — engine flooded.
- *Water on spark plugs* — water in petrol; cooling water leaking into cylinders.
- *Spark weak, short or yellowish* — cracks or pinholes in high-tension cable insulation; cables not pushed fully into terminal caps; water or salt deposits on high-tension wiring; breaker points badly adjusted; points pitted or burned; coil or condenser faulty.
- *Spark at terminal caps but not across plug gaps* — fouled spark plugs; defective spark plugs; plug gap too wide; cables not pushed fully into terminal caps.
- *No spark at terminal caps* — cables not pushed in fully; short circuit in tilt switch, stop switch, or their wiring; cracked insulation; breaker points maladjusted, pitted or burnt; coil or condenser faulty; flywheel key sheared.
- *Petrol and spark check okay* — terminal caps on wrong spark plugs.

¥ Engine starts, runs briefly, stops

- *Re-starts after short wait and re-priming* — fuel tank empty; fuel line not connected or secure; tank vent closed; fuel filter clogged; fuel line pinched or kinked; air leak in fuel system; weak spark, intermittent ignition fault.

¥ Engine spits but will not start, backfires, runs rough or will not idle

- *Operated well on first tank of fuel* — fouled or defective plugs; water in petrol; water in spare tank.

Chapter 6

Fixed Wing Aircraft

Most aircraft offer a safer service than travelling the same distance by road. You can reduce the total risk of flying by choosing the highest regulated levels of safety when alternatives are available. Be wary of selecting the cheapest option.

Ensure the carrier you choose provides additional safety features - i.e. more modern aircraft, weather radar, or more experienced pilots than the minimum required by the regulations. The best recommendation is to shop around and ask advice as to who are the longest established and best managed charter operators.

Just as wise car passengers carefully consider which driver they will travel with, it is more important to do this in the air, as most aviation accidents are the result of pilots making errors of judgment. Avoid using a pilot who is immature or inexperienced and who has **an accident couldn't happen to me** attitude.

RESPONSIBILITIES

Pilot Obligations

The pilot is in charge of the aircraft. It is their duty to safely load the aircraft and conduct a safe flight. The pilot is the sole arbiter of safety but total co-operation is needed from all passengers.

The Pilot will:

- ¥ Comply with all flight regulations of the country, province or state.
- ¥ File flight plans at airports and make sure that all local flights from field camps are monitored.
- ¥ Be responsible for the loading of any cargo into the aircraft.
- ¥ Grant permission for passengers to exit or approach and board the aircraft.
- ¥ Approve all loading of hazardous goods and dangerous cargo.
- ¥ Prior to take off the pilot will give passengers a safety briefing which includes:
 - entering and leaving the aircraft;
 - operating doors and emergency exits;
 - location of first aid kits and survival kits (water);
 - location and operation of Emergency Locator Beacon ELT.And if travelling over water include:
 - wearing and using life jackets;
 - locating and operating life rafts;
 - ditching and leaving the aircraft.

Passenger Obligations

Passengers must obey the pilot at all times and do nothing to jeopardise the safety of a flight.

Passengers will:

- ¥ Wear seat belts at all times.
- ¥ Never insist that the pilot:
 - overload the aircraft;
 - fly in bad weather;
 - use an unsuitable landing strip;

— fly beyond their licence limitations.

- ¥ Comply with pilot briefings concerning in flight procedures, including emergencies, embarking and disembarking and general safety.
- ¥ **Never carry or send dangerous goods without the pilot's prior knowledge and permission.** Certain items such as explosives, acids, etc, are classified as Dangerous Cargo. If in doubt ask the pilot.

GENERAL PROCEDURES —LIGHT AIRCRAFT

Light aircraft should always be boarded some distance from the main passenger terminal and always from level ground because of the danger of propeller blades. An aircraft which has its engine running, should not be approached until the blades stop turning.

Do not smoke within 50 metres of an aircraft.

The weighing of articles is required when large loads are being considered (don't guess). **Never overload an aircraft.**

COMMUNICATION AND SEARCH AND RESCUE (SAR) PROCEDURES

If you charter an aircraft, you should confirm that the pilot has a flight plan lodged with the appropriate authorities (CASA) or flight notification is held by a facility, which can maintain two way communications with the aircraft during the entire flight.

Do not deviate from the agreed flight plan unless the written records and SAR are amended before the destination is changed, even if it involves an unscheduled return to camp. You will be creating a vastly increased safety risk in the event of a search. Lodging larger than necessary location areas to gain increased perceived freedom of action, is not an acceptable practice.

If radio communications become impossible, operations should stop as soon as practicable.

Aircraft Emergency Locator Transmitters (ELTs)

All aircraft must be equipped with an Emergency Locator Transmitter (ELT). An ELT automatically broadcasts a distinct signal on an internationally monitored distress frequency when an aircraft is involved in a crash. ELTs have a manual switch for testing purposes and manual emergency use.

- ¥ Pilots should show passengers where the ELT is located before flights. All passengers should know how to activate an ELT in case it fails to engage after an emergency landing.
- ¥ Some ELTs can be removed from an aircraft. To broadcast a signal with the best range, place the ELT as high as possible so that it has a 360° range.
- ¥ Once started, an ELT signal should not be turned off. Search and rescue efforts need to receive the signal continuously to home in on it.

Night Time Operations

Night flying operations should not be made in remote areas. The exception is in the case of an emergency medivac by the Royal Flying Doctor Service (RFDS). Night time operations are only possible on airstrips registered with the RFDS.

FLYING IN REMOTE AREAS PROCEDURE

When flying in remote areas personnel should carry and wear the following:

1. Sturdy hiking boots
2. Pocket knife
3. Personal first aid kit
4. Personal EPIRB
5. Portable radio - if available

A container of drinking water should be carried on the aircraft.

Procedure for Remote Airstrips

General requirements for airstrips include:

- ¥ Construction so they are only closed by the heaviest rains.
- ¥ Daily inspection, before aircraft movements.
- ¥ Periodic maintenance (grading, check wind sock, etc)
- ¥ Low level fly over of unattended strips to check for obstructions and startle animals away from strip.
- ¥ Periodic inspection.

Inspection of strips to include:

1. Check for softness, particularly after rain, and for smoothness. Driving a car at 80 kph with complete control and comfort is one method of checking the smoothness of the surface. Driving a heavy vehicle at 10 kph will check for a boggy surface. If the vehicle breaks through the surface, the aircraft will surely bog on landing.
2. Check for holes or gutters.
3. The strip should be clear of anthills, saplings, long grass and other obstructions.
4. Condition of wind sock or other means of wind direction.
5. Animals or livestock in the vicinity of the landing area.
6. Visibility if dust, rain or smoke are present.

ROYAL FLYING DOCTOR SERVICE (RFDS)

To save time in an emergency it is important that accurate details of all airstrips are known to the RFDS. If there is a strip in your area which

1. you think they do not know about,
2. has just been constructed, or
3. has had changes made to it,

contact the RFDS and let them know the following details:

- ¥ Aerodrome name.
- ¥ Position of strip in Latitude and Longitude, elevation above sea level, and its relation to homestead, town, highway or river, e.g. adjacent of 3km south east.
- ¥ Strip bearing and length, e.g. 080/260 - 700m (normal RFDS requirements are for strips longer than 1000m).
- ¥ Any other remarks regarding availability of fuel and fuel type, type ie, Avgas or Jet A-1.
- ¥ Type of surface (soil, stony, gravel) effect of rain on surface, obstructions close to strip or approach, name on homestead roof, etc.

Report these details to the RFDS base nearest to you.

It is necessary that the condition of the strip and approaches be checked periodically. If a RFDS aircraft is expected, an inspection must be carried out to check all the features normally required in remote airstrips.

Chapter 7

Helicopters

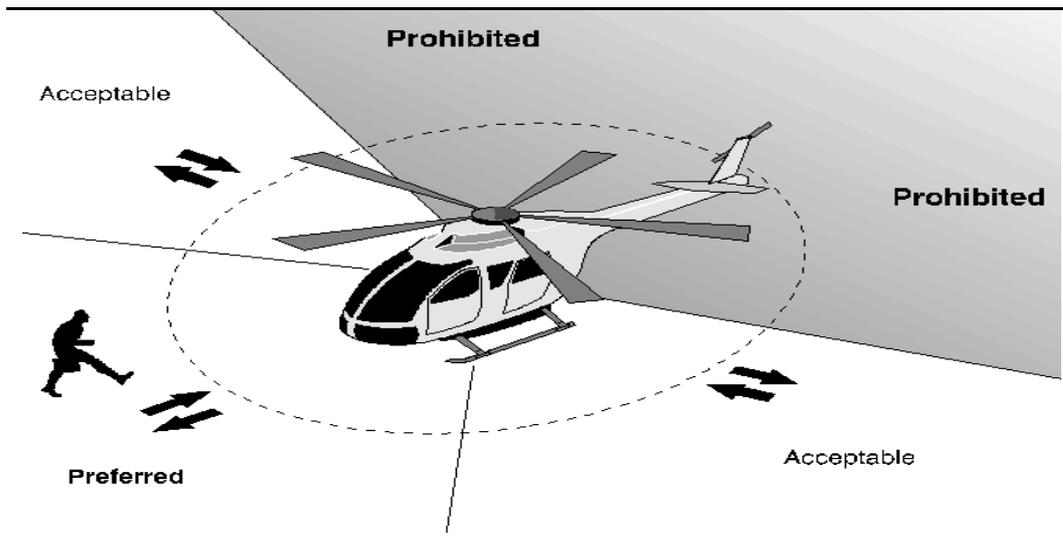
The choice of helicopters is much greater than fixed wing aircraft. Helicopters range from small piston engine machines most of which are relatively old and have small carrying capacity through to turbine machines such as the Bell 206 (Jetranger) and Squirrel which have higher speed, better lifting and passenger capacity.

Turbine engine helicopters are suitable for jobs where two to four/five passengers are to be carried, there are long distances, large samples (e.g. stream sediment sampling) or lifting heavy loads (e.g. slinging diamond drill rigs or fuel) are involved. The decision as to which company and machine type should be used depends on the total weight to be carried and the availability of suitably experienced operators. Job specifications must be correctly defined.

GENERAL RULES FOR HELICOPTERS

1. Piston powered helicopters are not to be used unless an emergency situation exists or written approval has been obtained from a Group Geologist.
2. Always wait until the pilot gives permission before approaching or leaving the helicopter.
3. Always approach a helicopter in a crouching position to give your head more clearance from the rotor blades.
4. Always approach and leave from the front and remain in full view of the pilot at all times. Do not approach when visibility is reduced by the down draft blowing up dust.
5. If you walk into the tail rotor it will kill you. Never walk in the direction of the tail rotor. Never walk behind or under the tail, even when the rotors are stopped.
6. Always approach or exit a helicopter from the down hill side if the craft is on a slope.
7. Never throw anything out of a helicopter.
8. Carry all long items horizontally, never carry them vertically or over your shoulder as they may hit the main rotor blades.
9. Never travel in a helicopter that is slinging a load.
10. Beware if you touch a helicopter or its load before it has completely landed, as it is usually charged with static electricity.
11. Wear seat belts at all times during flight.

Safe Entering and Exiting from Helicopters



RESPONSIBILITIES

To ensure that the helicopters can be operated in a safe manner both the pilot and the passengers need to be aware of their responsibilities.

Pilot Obligations

The pilot must provide all passengers with a safety briefing and instructions before take off, covering the following:

- Entering, exiting or moving around the aircraft.
- Operating doors and emergency exits.
- Locating and operating aircraft radios.
- Locating and using fire extinguishers.
- Locating first aid and survival kits (water).
- Locating and operating Emergency Locator Beacon (ELB).
- Destination and flight path, any way points, anticipated flight duration and during the flight any unscheduled deviations.
- Search and Rescue (SAR) watch notification and procedures.

And for flights over water:

- Wearing and using life jackets.
- Locating and operating life rafts.
- Ditching and leaving the aircraft.
- Locating and operating the marine/water type Emergency Locator Beacon.

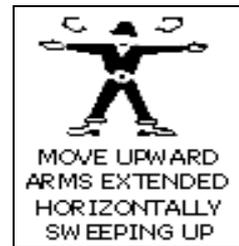
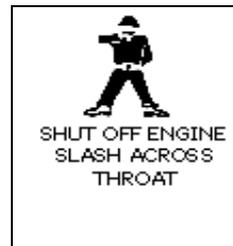
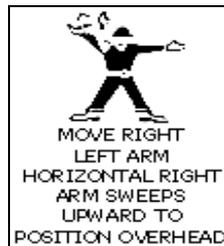
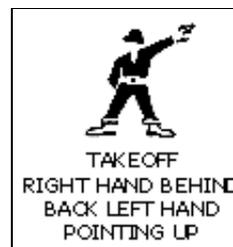
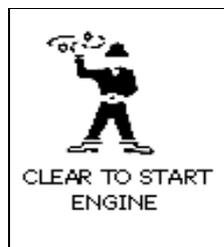
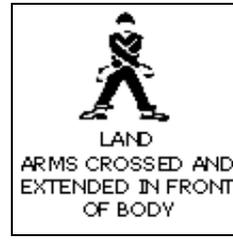
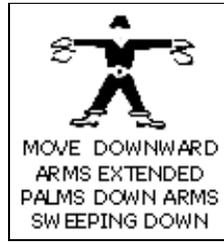
Passenger Obligations

All **passengers** must:

- Not approach the aircraft until the pilot indicates that it is safe to do so.
- Wear seat belts at all times during flight.
- Keep seat belts fastened until the pilot tells you to leave the aircraft.
- Not smoke within 50 metres of the aircraft.
- Not extend any part of the body out of the aircraft (e.g. waving from windows).

- Not talk to the pilot during take off, climb, descent, landing or in bad weather.
- Wear hiking boots and carry a personal survival kit when flying in remote areas or over rugged terrain.

HELICOPTER HAND SIGNALS



Chapter 8

Health and First Aid

These field safety guidelines do not attempt to cover the whole topic of first aid. Every field worker should have completed a basic level first aid and CPR (cardio-pulmonary resuscitation) course. The information below is designed to assist in the management of a casualty's immediate needs and is covered in the Senior First Aid Certificate.

In all emergencies follow the DRABC action Plan.

DRABC

- ¥ **Danger:** Only proceed if it is safe to do so. Ensure that no one else gets injured and if possible remove the casualty to a safer position.
- ¥ **Response:** Check the casualty for consciousness. If conscious, manage any bleeding, if unconscious, turn the casualty on their side.
- ¥ **Airway:** With the casualty on their side, check for and remove any foreign objects from their airway with your fingers.
- ¥ **Breathing:** Look and listen for breathing. If the casualty is not breathing turn them on their back and commence EAR (Expired Air Resuscitation).
- ¥ **Circulation:** Feel the carotid pulse at the neck. If the pulse is present continue to manage bleeding, if there is no pulse commence CPR (Cardio Pulmonary Resuscitation).

INITIAL RESUSCITATION

If the patient is not breathing:

- ¥ Tilt the head back (pistol grip).
- ¥ Give 2 breaths in 10 seconds (chest must move).
- ¥ Check pulse (carotid).
- ¥ If no pulse, go immediately to CPR.

EAR (EXPIRED AIR RESUSCITATION)

- ¥ Tilt head back.
- ¥ Give 1 breath every 4 seconds (15 per minute).
- ¥ Check pulse after 1 minute, then every 2 minutes.
- ¥ If no pulse, go immediately to CPR.

CPR (CARDIO PULMONARY RESUSCITATION)

- ¥ Place the heel of one hand on lower half of sternum
- ¥ Grasp wrist area with other hand, keep fingers off chest
- ¥ Compress (push down) sternum vertically 4-5 cm
- ¥ Check Pulse after 1 minute then every 2 minutes
- ¥ Rate:

One Operator	Two Operators
¥ 2 breaths in 5 seconds	¥ 1 breath every 5 compressions
¥ 15 compressions in 10 seconds	¥ 1 compression every 1 second
¥ Repeat 4 times per minute	¥ Repeat 12 times per minute
	¥ Cardiac operator must count aloud

BLEEDING

All bleeding should be stopped (except for the ear — cover the ear loosely and let drain freely — seek medical aid).

ARTERIAL BLEEDING — is bright red and spurts (being pumped out under pressure)

VENOUS BLEEDING — is dark red and pours out

CAPILLARY BLEEDING — oozes out

HEAT STRESS

The combination of high temperature, high humidity, over-exertion, and lack of acclimatisation all contribute to the development of heat-related illnesses. It need not be especially hot. Heat-related illnesses can develop if the air temperature exceeds 23°C. However, the higher the temperature and humidity, the more likely the danger of heat-related illnesses.

Evaporation of sweat is the main mechanism for cooling the human body. The onset of heat-related illness usually occurs when the body core temperature begins to rise because there is not enough water available within the body to produce the necessary amount of sweat (dehydration). Your body must be able to produce sweat freely. Furthermore, this sweat must evaporate from your skin for maximum cooling effect. Sweat that pools and runs off your body does little to cool you. It is important to recognise the need for acclimatisation and fluid replacement to prevent various heat-induced illnesses, especially when engaged in strenuous work.

Prevention of Heat-Related Illness

Drink plenty of water. Avoid dehydration. Do not rely on thirst to indicate how much to drink. Drink large quantities before you begin work, and about 250 ml (1 cup) every 20 minutes while you work. Water is best; carbonated drinks are less effective. Do not drink milk, undiluted fruit juices, or any form of alcohol. Alcohol actually causes your body to lose fluids. When performing moderately strenuous work in a hot environment, you need to drink at least 5 litres of water a day.

- ¥ Wear a broad brimmed hat in the sun.
- ¥ Increase your salt intake slightly. The salt in most prepared foods should be sufficient. Salt tablets should be taken only on the advice of a doctor. However, if you have been sweating heavily, an electrolyte-glucose drink such as Gatorade or Leucozade might be advisable.
- ¥ Wear light coloured, loose fitting clothing that does not leave too much skin exposed.
- ¥ Listen to your body. Don't over-exert yourself in hot or humid weather, on or off the job.
- ¥ Become acclimatised, whether you are new to a hot climate or are returning from a break, sickness, or annual leave.

HYPERTHERMIA (EXPOSURE TO HEAT)

There are three main types of hyperthermia or heat stress: heat cramps, heat exhaustion, and heat stroke. A fourth type, prickly heat rash, is an annoying but less disabling form of heat stress. Heat cramps and heat exhaustion result from dehydration and salt depletion as the body sweats to lower its internal temperature. Heat stroke occurs when the body core temperature exceeds 41°C because its cooling mechanisms have broken down. This condition can cause death. **Heat stroke requires immediate medical attention. You can avoid almost all cases of hyperthermia by taking preventative measures.**

Prickly Heat/Heat Rash

This skin condition is common in the tropics. It is aggravated by high humidity. Tiny droplets of sweat become trapped under the outer layer of skin. These droplets appear as an irritating, blister-like red rash. Frequent showering helps prevent its development. Sometimes a drying lotion and mild talcum powder help, but ointments and creams will clog up the outlets of your sweat glands even further.

Heat Cramps

These painful spasms usually occur in your arm and leg muscles. They can be disabling, but they are preventable if you pay attention to replacing the salt and water lost through sweating. Heat cramps can be treated by gently stretching the muscle and applying ice.

Heat Exhaustion

If you do not replace the fluids lost through sweating, you may develop heat exhaustion. Although a person suffering from heat exhaustion can continue to produce sweat, the production is not great enough to cool the body satisfactorily. While there is no significant rise in the core body temperature of a victim of heat exhaustion, the condition can rapidly develop into heat stroke. The symptoms for heat exhaustion are the same as for shock.

Symptoms of Heat Exhaustion

- ¥ Cool clammy skin.
- ¥ Weakness or fatigue.
- ¥ Headache nausea, vomiting muscle cramps.
- ¥ Dizziness
- ¥ Confusion.

Treatment

Move the victim to a cool area. Cool the victim if necessary, and replace the water and salt lost by dehydration. Have the victim lie down with feet elevated. Although a victim of heat exhaustion may feel better almost immediately and wish to return to work, 24 hours of rest is needed for adequate rehydration to occur.

Heat Stroke

Heat stroke is a life-threatening condition demanding immediate medical attention. As the body core temperature approaches 41°C, the skin usually becomes hot and dry, and the victim can no longer produce sweat. Once this happens, the victim will die if his or her body temperature continues to rise. Provide interim treatment and transport victims of heat stroke to a medical treatment facility as soon as possible, because complications frequently develop.

Symptoms of Heat Stroke

- ¥ Hot dry skin.
- ¥ Rapidly rising core temperature.
- ¥ Rapid pulse.
- ¥ Headache nausea and vomiting.
- ¥ Delirium.
- ¥ Convulsions.
- ¥ Collapse and coma.

Interim Treatment — Prior to Medical Evacuation

1. Get the victim out of the sun and into the coolest possible location.
2. Loosen tight clothing and elevate the feet.

3. Cool the victim as quickly as possible, paying particular attention to the head, armpits, and groin. Drape the victim with lukewarm wet sheets or towels to conduct heat away from the body.
4. Fan the body, using electric or hand-held fans. Try to place the victim on a screen so they can be cooled both from above and below. The aim is to maximise evaporation from the body to cool the core body temperature, without chilling the victim.

To Cool a Victim of Heat Disorder

- ¥ An efficient way to cool someone who is overheated is to douse the victim with lukewarm water or cover with wet clothing. Place the victim in a vehicle with the windows down so that he or she is exposed to the moving air. Drive back to a medical treatment facility or rest area, as needed.
- ¥ Use water, wet blankets, or wet clothing to cool the skin of the victim. Use water with a temperature that is warm to the touch, but cooler than skin temperature. This temperature produces the best cooling effect by evaporation and conduction. Water that is too cold will effectively shut down the blood supply to the skin. It can also induce shivering as the body works to warm up that local area.

TRANSPORT THE VICTIM TO MEDICAL HELP AS SOON AS POSSIBLE

Sunburn

The sun produces ultraviolet radiation (UV) that can cause serious burns to your eyes and skin. Both direct and reflected radiation cause burning and the best way to avoid sunburn is to avoid exposure as much as possible. You can do this by wearing sunglasses with Polaroid lenses, wearing trousers, long sleeved shirts, a wide brim hat and by using sun screen on your exposed skin. Various products are available that contain agents to block UV radiation. Skin damage from repeated episodes of sunburn can lead to premature aging of the skin and other serious complications. Pay special attention to your hands; people that work outdoors frequently develop skin cancers on their hands due to prolonged exposure to the sun.

Prevention

- ¥ The best prevention is to cover exposed areas. Wear a broad brimmed hat, shirt, long pants, sunglasses, and sun screen when appropriate. Shorts expose your legs to sunburn.
- ¥ Time of day: UV radiation causes most damage between 10 am and 4 pm when the sun is highest in the sky.
- ¥ Season of the year: Except near the equator, UV radiation is more intense during summer months when the sun is closer to Earth.
- ¥ Wind: Wind masks the effect of UV radiation.
- ¥ Filters: Sunglasses fitted with Polaroid lenses will cut down UV radiation exposure to your eyes.
- ¥ Taking certain medications often increases a person's sensitivity to UV radiation. These include tetracyclines, sulphonamides, and oral anti-diabetics.

Treatment

- ¥ Keep the sunburned area covered loosely to stop exposure to more sun.
- ¥ Cold compresses help; creams or lotions, such as moisturisers may help, but do not apply these to blisters.

HYPOTHERMIA (EXPOSURE TO COLD)

Travelling or working in cold weather conditions can lead to Hypothermia. Many variables contribute to the development of hypothermia. Age, health, nutrition, body size, exhaustion, exposure, duration of exposure, wind, temperature, wetness, medication and intoxicants may decrease heat production, increase

heat loss, or interfere with thermostability. The healthy individual's compensatory responses to heat loss via conduction, convection, radiation, evaporation and respiration may be overwhelmed by exposure.

1. Radiation — loss of heat to the environment due to the temperature gradient (this occurs only as long as the ambient temperature is below 37°C). Factors important in radiant heat loss are the surface area and the temperature gradient.

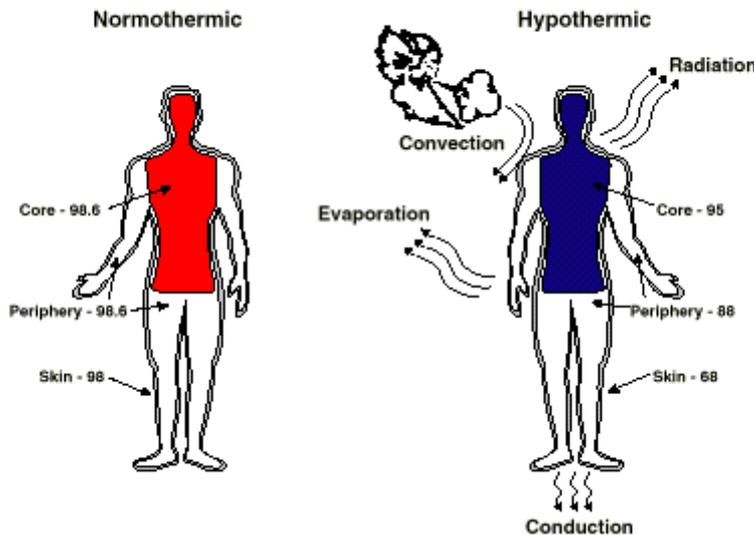
2. Conduction — through direct contact between objects, molecular transference of heat energy. Water conducts heat away from the body 25 times faster than air because it has a greater density (therefore a greater heat capacity). **Stay dry = stay alive!**

3. Convection — is a process of conduction where one of the objects is in motion. Molecules against the surface are heated, move away, and are replaced by new molecules which are also heated. Wind Chill is an example of the effects of air convection.

4. Evaporation — heat loss from converting water from a liquid to a gas

- ¥ Sweating - body response to remove excess heat.
- ¥ Insensible Perspiration - body sweats to maintain humidity level of 70% next to skin - particularly in a cold, dry environment you can lose a great deal of moisture this way.
- ¥ Respiration - air is heated as it enters the lungs and is exhaled with an extremely high moisture content heat loss. As body moisture is lost through the various evaporative processes the overall circulating volume is reduced which can lead to dehydration. This decrease in fluid level makes the body more susceptible to hypothermia and other cold injuries.

How We Lose Heat to the Environment



Conditions Leading to Hypothermia

- ¥ Cold temperatures.
- ¥ Improper clothing and equipment.
- ¥ Wetness.
- ¥ Fatigue, exhaustion.
- ¥ Dehydration.
- ¥ Poor food intake.
- ¥ No knowledge of hypothermia.
- ¥ Alcohol intake — causes vasodilation leading to increased heat loss.

Signs and Symptoms of Hypothermia

Stage	Core Temperature	Signs and Symptoms
Impending Hypothermia	37.2... - 36.1...	Normal shivering begins, pale skin, fatigue & signs of weakness begin to show.
Mild Hypothermia	36.1... - 35...C	Cold sensation, goose bumps, unable to perform complex tasks with hands, shiver can be mild to severe, hands numb.
Moderate Hypothermia	35... - 33.9...C	Intense shivering, lack of muscle coordination becomes apparent, movements slow and laboured, stumbling pace, mild confusion, may appear alert. Use sobriety test, if unable to walk a 30 foot straight line, the person is hypothermic.
	33.9... - 32.2...	Violent shivering persists, difficulty speaking, sluggish thinking, amnesia starts to appear, gross muscle movements sluggish, unable to use hands, stumbles frequently, difficulty speaking, signs of depression, withdrawn.
Severe Hypothermia	32.2... - 30.0...	Shivering stops, exposed skin blue or puffy, muscle coordination very poor, inability to walk, confusion, incoherent/irrational behaviour, but may be able to maintain posture and appearance of awareness.
	30.0... - 27.8...	Muscle rigidity, semiconscious, stupor, loss of awareness of others, pulse and respiration rate decrease, possible heart fibrillation.
	27.8... - 25.6...	Unconscious, heart beat and respiration erratic, pulse may not be palpable.
	25.6... - 23.9...	Pulmonary oedema, cardiac and respiratory failure, death. Death may occur before this temperature is reached.

How to Assess if Someone is Hypothermic

- ¥ If shivering can be stopped voluntarily this is impending to mild hypothermia.
- ¥ Ask the person a question that requires higher reasoning in the brain (count backwards from 100 by 9s). If the person is hypothermic, they won't be able to do it. (Note: there are also other conditions such as altitude sickness that can also cause the same condition.)
- ¥ If shivering cannot be stopped voluntarily they have moderate to severe hypothermia.
- ¥ If you can't get a radial pulse at the wrist it indicates a core temperature below 32.2 - 30.0°C.
- ¥ The person may be curled up in a foetal position. Try to open their arm up from the foetal position, if it curls back up, the person is alive. Dead muscles won't contract only live muscles.

Treating Hypothermia

The basic principles of rewarming a hypothermic victim are to conserve the heat they have and replace the body fuel they are burning up to generate that heat. If a person is shivering, they have the ability to rewarm themselves at a rate of 2°C per hour.

Impending Hypothermia

- ¥ Seek or build a shelter to get the person out of the cold, windy, wet environment.
- ¥ Start a fire or get a stove going to provide warmth. Provide the person with a hot drink (no alcohol, coffee or tea).
- ¥ Halt further heat loss by insulating the person with extra clothes, etc. This person should recover from the present condition quite quickly.

Mild Hypothermia

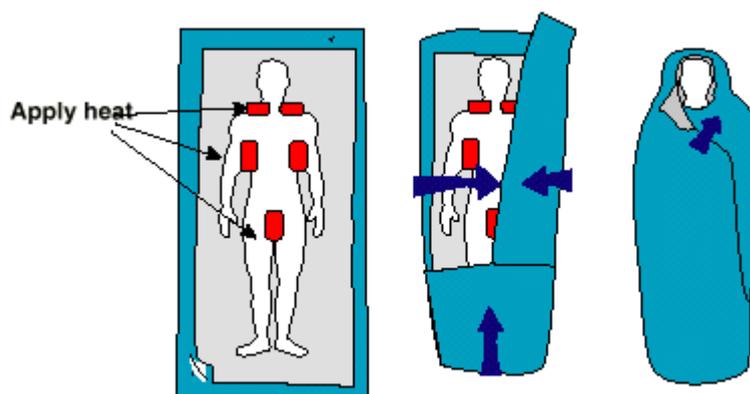
- ¥ Remove or insulate the patient from the cold environment, keeping the head and neck covered. This prevents further heat loss and allows the body to rewarm itself.
- ¥ Provide the patient with a warm, sweetened drink (no alcohol, coffee or tea) and some high energy food. Limited exercise may help to generate some internal heat, but it depletes energy reserves.

Moderate Hypothermia

- ¥ Remove or insulate the patient from the cold environment, keeping the head and neck covered. Apply mild heat (*comfortable to your elbow*) to the head, neck, chest, armpits and groin of the patient.
- ¥ Use hot water bottles, wrapped Thermo-Pads, warm rocks, or warm moist towels.
- ¥ It is possible that you may have to continue this treatment for some time. Offer sips of warm, sweetened liquids (no alcohol, coffee or tea) if the patient is fully conscious, beginning to rewarm and is able to swallow. Patient should be seen by a physician.

Severe Hypothermia

- ¥ Place patient in a prewarmed sleeping bag with one or two other people. Skin to skin contact in the areas of the chest (ribs) and neck is effective. Exhale warm air near the patient's nose and mouth, or introduce steam into the area.
- ¥ Try to keep the patient awake, ignore pleas of "leave me alone, I'm OK". The patient is in serious trouble, keep a close, continuous watch over the patient.
- ¥ Apply mild heat, with the aim of stopping temperature drop, not rewarming.
- ¥ If patient has lost consciousness be very gentle, as by now the heart is extremely sensitive. Always assume the patient is revivable, do not give up.
- ¥ Check for pulse at the carotid artery. If, after *two minutes* you find no pulse, check on the other side of the neck for two minutes.
- ¥ If there is any breathing or pulse, no matter how faint, do not give CPR but keep very close watch for changes in vital signs.
- ¥ If no pulse is found begin CPR immediately, stopping only when the heart begins to beat or the person applying CPR can not carry on any longer without endangering himself.
- ¥ Medical help is imperative, hospitalisation is needed.



Hypothermia Wrap

Afterdrop

Is a situation in which the core temperature actually decreases during rewarming. This is caused by peripheral vessels in the arms and legs dilating if they are rewarmed. This dilation sends this very cold, stagnate blood from the periphery to the core further decreasing core temperature which can lead to death. In addition, this blood also is very acetic which may lead to cardiac arrhythmia and death. ***Afterdrop can best be avoided by not rewarming the periphery. Rewarm the core only! Do not expose a severely hypothermic victim to extremes of heat.***

CPR and Hypothermia

When a person is in severe hypothermia they may demonstrate all the accepted clinical signs of death:

- ¥ Cold.
- ¥ Blue skin.
- ¥ Fixed and dilated pupils.
- ¥ No discernible pulse.
- ¥ No discernible breathing.
- ¥ Comatose and unresponsive to any stimuli.
- ¥ Rigid muscles.

But they still may be alive in a **metabolic icebox** and can be revived.

A hypothermia victim is not dead until WARM and dead

Make sure you do a complete assessment of heart rate before beginning CPR. Instituting cardiac compressions at this point may lead to life-threatening arrhythmia. Check the carotid pulse for a longer time period (up to a minute) to ascertain if there is some slow heartbeat. Even though the heart is beating very slowly, it is filling completely and distributing blood fairly effectively. Remember, the heart rate may be 2-3/minute and the breathing rate 1/30 seconds. Thus, with its severely decreased demands, the body may be able to satisfy its circulatory needs with only 2-3 beats per minute. ***Be sure the pulse is absent before beginning CPR. You will need to continue to do CPR as you rewarm the person.***

Ventilation may have stopped but respiration may continue - the oxygen demands for the body have been so diminished with hypothermia that the body may be able to survive for some time using only the oxygen that is already in the body. If ventilation has stopped, artificial ventilation may be started to increase available oxygen. In addition, blowing warm air into the persons lungs may assist in internal rewarming.

CPR Procedures

- ¥ Check radial pulse. This pulse disappears between 33.0 and 30.0°C.
- ¥ Check for carotid pulse - wait at least a full minute to check for very slow heartbeat.
- ¥ If pulse but not breathing or slow breathing, give rescue breathing (also adds heat).
- ¥ If no discernible heartbeat begin CPR and be prepared to continue. Persons with hypothermia have been given CPR for up to 3.5 hours and have recovered with *no* neurological damage.
- ¥ Begin active rewarming.

COLD INJURIES

Tissue temperature in cold weather is regulated by two factors, the external temperature and the internal heat flow. All cold injuries described below are intimately connected with the degree of peripheral circulation. As peripheral circulation is reduced to prevent heat loss to the core, these conditions are more likely to occur. Tissue can freeze if the temperature is above 0°C. It has to be below -2.2°C because of the salt content in body fluids. Distal areas of the body and areas with a high surface to volume ratio are the most susceptible (e.g ears, nose, fingers and toes — this little rhyme should help remind you what to watch out for in yourself and others).

¥ Surface frostbite generally involves destruction of skin layers resulting in blistering and minor tissue loss. Blisters are formed from the cellular fluid released when cells rupture.

¥ Deep frostbite can involve muscle and bone.

	Cold Response	Mild Frostnip	Superficial Frostbite	Deep Frostbite
Sensation	painful	may have sensation	numb	numb
Feels	normal	normal	soft	hard
Colour	red	white	white	white

Cold Response

- ¥ Circulation is reduced to the area to prevent heat loss.
- ¥ The area may be pale and cold.
- ¥ It may have sensation or be numb.

Frostnip

- ¥ Freezing of top layers of skin tissue.
- ¥ It is generally reversible.
- ¥ White, waxy skin, top layer feels hard, rubbery but deeper tissue is still soft.
- ¥ Numbness
- ¥ Most typically seen on cheeks, earlobes, fingers, and toes.

Treatment

- ¥ Rewarm the area gently, generally by blowing warm air on it or placing the area against a warm body part (stomach or armpit).
- ¥ **Do not rub the area**, this can damage the effected tissue by having ice crystals tear the cell.

Frostbite

- ¥ Skin is white and **Wooden** Feel all the way through.
- ¥ Superficial frostbite includes all layers of skin.
- ¥ Numbness, possible anaesthesia.
- ¥ Deep frostbite can include freezing of muscle and/or bone, it is very difficult to rewarm the appendage without some damage occurring.

Treatment

- ¥ Superficial frostbite may be rewarmed as frostnip if only a small area is involved.
- ¥ If deep frostbite, see below for rewarming technique.

Treatment and Prevention of Trench Foot

Trench foot is an infection of the feet caused by cold, wet and insanitary conditions.

- ¥ Treatment includes careful washing and drying of the feet, gentle rewarming and slight elevation. Since the tissue is not frozen as in severe frostbite, it is **more** susceptible to damage by walking on it. Cases of trench foot should not walk out; they should be evacuated by litter. Pain and itching are common complaints. Give Ibuprofen or other pain medication.
- ¥ Prevention is the best approach to dealing with trench foot. Keep feet dry by wearing appropriate foot-wear. Check your feet regularly to see if they are wet. If your feet get wet (through sweating or immersion), stop and dry your feet and put on dry socks. Periodic air drying, elevation, and massage will also help. Change socks at least once a day and do not sleep with wet socks. Be careful of tight socks which can further impair peripheral circulation. Foot powder with aluminium hydroxide can

help. High altitude mountaineers will put antiperspirant on their feet for a week before the trip. The active ingredient, aluminium hydroxide, will keep your feet from sweating for up to a month.

Chillblains

- ¥ Caused by repeated exposure of bare skin to temperatures below 15.5°C.
- ¥ Redness and itching of the effected area.
- ¥ Particularly found on cheeks and ears, fingers and toes.
- ¥ Women and young children are the most susceptible.
- ¥ The cold exposure causes damage to the peripheral capillary beds. This damage is permanent and the redness and itching will return with exposure.

Avoiding Frostbite and Cold Related Injuries

- ¥ **Buddy system**— keep a regular watch on each other's faces, cheeks, ears for signs of frostnip/frostbite.
- ¥ Keep a regular **self check** for cold areas, wet feet, numbness or anaesthesia.
- ¥ ***If at any time you discover a cold injury, stop and rewarm the area (unless doing so places you at greater risk).***

EYE INJURIES

Freezing of Cornea

- ¥ Caused by forcing the eyes open during strong winds without goggles.
- ¥ Treatment is very controlled, rapid rewarming, e.g. placing a warm hand or compress over the closed eye. After rewarming the eyes must be completely covered with patches for 24-48 hours.

Eyelashes freezing together

- ¥ Put hand over eye until ice melts, then open the eye.

Snow Blindness

- ¥ Sunburn of the eyes.
- ¥ Prevention by wearing good sunglasses with side shields or goggles. Eye protection from sun is just as necessary on cloudy or overcast days as it is in full sunlight when you are on snow. Snow blindness can even occur during a snow storm if the cloud cover is thin.

Symptoms occur 8-12 hours after exposure. Eyes feel dry and irritated, then feel as if they are full of sand, moving or blinking becomes extremely painful, exposure to light hurts the eyes, eyelids may swell, eye redness, and excessive tearing.

Treatment

- ¥ Cold compresses and dark environment.
- ¥ Do not rub eyes.

ALTITUDE SICKNESS (ACUTE MOUNTAIN SICKNESS —AMS)

Even if you are in perfect health, you can develop altitude sickness if you ascend rapidly to elevations above 1828m. More severe illness can occur if you travel above 2438m without acclimatising. The most common altitude related disorder is called Acute Mountain Sickness (AMS). The symptoms, in decreasing order of frequency, are headache, shortness of breath, light-headedness, fatigue, insomnia, loss of appetite and nausea.

The headache is often throbbing, made worse by lying down, and aggravated by strenuous exercise. Some or all of these symptoms may develop within 4 to 12 hours of reaching high altitudes, attain maximum severity within 24 to 48 hours, then subside after two to three days. If you ignore these early symptoms and continue to ascend to higher altitudes AMS can progress to a severe, life-threatening illness: high altitude pulmonary disease oedema (HAPE) and/or high altitude cerebral oedema (HACE).

Risk Factors that Influence Your Chance of Getting AMS

Anyone going to high altitudes can get AMS. Check the risk factors below to assess your potential risk:

- ¥ Fast ascent (more than 914m per day).
- ¥ Altitude above 1828m. Risk increases as altitude increases.
- ¥ Strenuous activity at high altitudes.
- ¥ Previous history of AMS.
- ¥ Obesity.
- ¥ Lack of acclimatisation.
- ¥ Females have slightly increased risk.
- ¥ Use of sedatives or sleeping pills.

Susceptibility to AMS can vary over time. Previous ability to ascend to high altitudes without getting AMS is no guarantee you won't become afflicted in the future.

Rapid travel to high altitudes increases the risk of AMS. Flying directly to a location where the altitude is greater than 1828m, for example in Peru, Cuzco is 3399m and Arequipa is 2304m above sea level. It takes only 3-5 hours to travel by car from Lima, near sea level to La Oroya, elevation 3779m above sea level.

How to Prevent AMS

Eat a high carbohydrate diet that is 70 to 80% carbohydrates. This type of diet generates more carbon dioxide in your body tissues, which in turn stimulates respiration.

Avoid high-protein diets. Compared to diets high in carbohydrates, a high-protein diet increases your body's water requirements and reduces cold tolerance.

Drink extra fluids. Dehydration is common at high altitudes and it may aggravate the symptoms of AMS.

Reduce activity. If you must travel rapidly to an elevation over 8000 feet you can reduce your chance of illness by not engaging in strenuous activities for several days.

Work high, sleep low. Try to sleep at a lower altitude, if this is an option.

Take a prophylactic drug If you have to ascend rapidly to high altitudes without the opportunity to acclimatise, consider taking a drug that helps prevent AMS. These same drugs can be used to treat AMS. Discuss medications and doses with your doctor or Travellers Medical Vaccination Centre (TMVC) before you leave Australia.

Acetazolamide (Diamox) will lessen your chance of getting AMS by 30 to 50% and can be used to treat AMS.

Dexamethasone (Decadron) Use for treating AMS when symptoms are more pronounced or if descent must be delayed.

Acetazolamide and Dexamethasone have been shown to be valuable for prophylactics or treatment of AMS, but, if unremitting symptoms of AMS occur, DESCENT IS IMPERATIVE.

Treatment of AMS

Mild AMS is like a hangover: headache, fatigue, nausea, and loss of appetite. You will also notice insomnia and increased breathlessness. Symptoms should clear in two to three days. To help the headache take aspirin. Acetazolamide is effective for treating AMS.

Moderate AMS is an extension of mild AMS. If your headache becomes severe and you notice increased shortness of breath on exertion, you are developing moderate AMS. The most important symptom of moderate AMS, however, is ataxia (staggering gait). Stop your ascent immediately if these symptoms occur. Use oxygen (flow rate of 4ltrs/min.) if it's available. Acetazolamide and Dexamethasone may also help. **You must descend to a lower altitude if your symptoms do not improve.** Descending to a lower altitude is the most reliable treatment. Noticeable improvement may result if you descend as little as 457m but a descent of at least 914m is recommended. Further descent, however, may be necessary if you have ataxia or other symptoms that don't remit.

MOSQUITOES

Mosquitoes can spread diseases such as **Malaria, Dengue Fever** and the **Ross River Virus**. *Prevention is the best cure. Avoid being bitten.*

Wear long sleeved shirts and long pants especially in the evening. Use an insect repellent on all exposed skin and reapply frequently. Also apply repellents to your clothes. Use a repellent containing at least 15% but not more than 55% DEET (N, N-diethyl metatoluamide). Do not use higher concentrations, as small quantities of DEET are absorbed through the skin and reactions may occur. Sleep under a mosquito net.

TICKS

Some sixty species of ticks exist in Australia. The Australian scrub tick, also known as the paralysis tick or dog tick is potentially the most dangerous tick in Australia. It is a minute parasite that delivers a paralysing toxin and if not removed can eventually cause death, even in human beings. The Australian scrub tick occurs mainly along the coastal areas of eastern Australia. On humans they tend to hide in the folds of the skin or above the hairline and have been known to attach themselves to the eardrum.

Prevention is the best cure. Avoid being bitten.

Wear long sleeved shirts and long tucked in pants and footwear that completely cover your feet. Apply DEET insect repellents to yourself and your clothes. Conduct daily checks on your clothing and body for attached ticks.

Remove ticks by sliding the open blades of a pair of small, sharp scissors or tweezers, one on each side of the tick, and lever the tick outwards, being careful not to leave the mouth parts in the skin. Cleanse the area thoroughly and apply a mild antiseptic.

- ¥ Do not apply the hot tip of a cigarette or match to the tick's body.
- ¥ Do not apply petrol, acetone, methylated spirits or turpentine to the tick.

These actions may cause the tick to inject infected fluids into your bloodstream.

SANDFLIES

Sandflies are common and their bites can cause irritation. Prevention is the best cure. Avoid being bitten. Wear long sleeved shirts and long pants especially in the evening. Use an insect repellent on all exposed skin and reapply frequently. Also apply repellents to your clothes.

LEECHES

There are a number of species of leeches in Australia living in ponds, waterways and the damp bush. Not all species are bloodsuckers. Many are predators, which eat earthworms etc. Leeches, once attached to humans, pierce the skin and inject an anticoagulant (hirudin) which prevents the blood clotting whilst they are feeding.

If you discover a leech attached to you do not, if possible, pull it off. A lighted match, salt or insect spray will induce it to let go. After removing the leech allow some bleeding from the wound and then wash it with strong antiseptic to prevent infection. The wound may still keep bleeding for several hours.

SNAKES

Some seventy percent of Australian snakes are venomous. Assume all snakes are venomous and leave them alone. Ninety percent of snakebites in Australia are at the ankle or below. Eight percent occur on the hand and two percent elsewhere. If you wear above ankle field boots and/or thick socks and/or long trousers you are less likely to get bitten. Use gloves when collecting wood. Never put your hand under anything without rolling it over with your boot.

If a person is bitten by a snake use the pressure bandage/immobilisation method of treatment.

The venom is conveyed from the site of the bite and absorbed into the blood stream via the small superficial lymph vessels just beneath the skin. These can easily be compressed thus slowing the venom flow into the blood system. The cause of death by snakebite is respiratory arrest by the gradual paralysis of all muscles including the diaphragm.

Using a pressure bandage, bandage straight over the snakebite and wind the bandage up the limb towards the body keeping a firm pressure.

- ¥ Apply the bandage tightly enough to compress the tissues, but not so tight as to restrict the flow of blood to the areas below the bandage.
- ¥ Rest and avoid excessive activity on the part of the patient.
- ¥ Reassure the patient.
- ¥ Seek medical aid urgently

Snake Bite

If you have been bitten/stung:

Don't panic!
Avoid unnecessary movement.

If you have been bitten by a dangerous snake, Australian or funnel web spider, then immobilise the limb. You should also apply a broad bandage over the whole bitten limb, at about the same pressure as for a sprained ankle.

If there is significant bleeding from the wound, try to slow the flow by local compression.

Procedure — First Aid for Snakebite

1. Keep the patient still and reassure them.
2. Maintain vital functions, if imperilled (e.g. DRABCQ)
3. Immediately apply a Pressure Immobilisation Bandage.
4. Try to keep the patient as still as possible and bring transport to them.
5. Always seek medical help at the earliest opportunity.
6. If the snake has been killed, bring it with the patient, but do not waste time, risk further bites and delay application of pressure bandage and splint by trying to kill the snake.

7. Do not wash the wound.
8. Do not use a tourniquet.
9. Do not cut or suck the wound.
10. Do not give alcohol to the patient.
11. Do not give food and only non-alcoholic clear fluids may be used for drinks.
12. Apply a firm broad bandage or similar (clothing strips or sample bags will do in an emergency) over the bite site, at the same pressure as for a sprain. Do not impede the circulation.
13. Apply further bandage over as much of the rest of the bitten limb as practical. It is often easiest to go over the top of clothing such as jeans, rather than move the limb to remove clothing.
14. Ensure the bitten limb is kept motionless by applying a splint and instructing the patient to cease all use of the limb and any general activity.

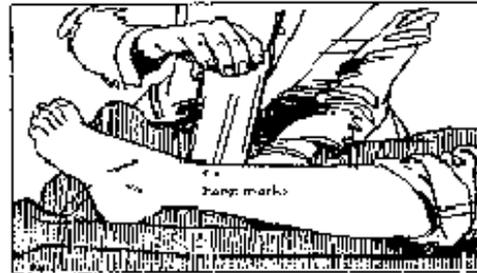
The pressure immobilisation method of first aid is ideal for Australian snakebite by all species, as well as bites from suspected funnel web spiders, and for bites by the blue ringed octopus, cone shells and severe stings by the box jellyfish (this must not precede vinegar treatment). It is not appropriate for bites from the red back spider, other spiders, scorpions or centipedes or stings from venomous fish.

Warnings

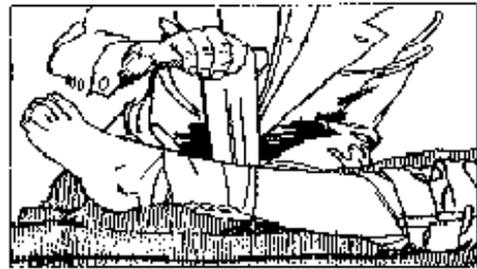
- ¥ Never bleed the site of the snakebite. A cut will allow poison into the bloodstream.
- ¥ Never wash or wipe the bite site because the residual venom on the skin may be identifiable in the laboratory when the patient arrives at the hospital. Venom is harmless on the skin.
- ¥ Never try to suck out the poison.
- ¥ Never use a constrictive (tourniquet) bandage.
- ¥ Never try to catch the snake.
- ¥ Never elevate the bitten limb.

Treatment for Snake Bite - Pressure Immobilisation

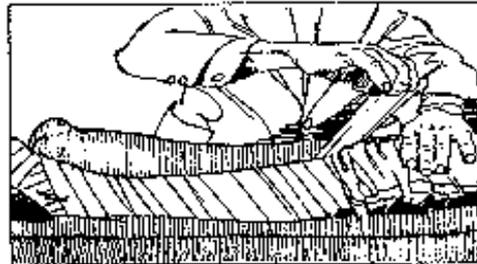
1. Apply a broad pressure bandage over the bite site as soon as possible. Do not take off pants as any movement will assist the venom to enter the blood stream. Keep the bitten limb still.



2. The bandage should be as tight as would apply to a sprained ankle.



3. Extend the bandage as high as possible up the limb.



4. Apply a splint to the leg.



5. Bind it firmly to as much of the leg as possible.



FIRST AID KITS

Personal First Aid kits should be carried at all times when working away from the vehicle. Make sure you replace any used items and regularly check the kits contents for items which may have passed their use-by date. RFDS first aid kits should be used in remote locations for extended periods of time.

BUSH FIRES

Preparation is the key to avoiding damage from bush fires. A firebreak must protect all field camps. All flammable materials such as wood and fuel should be stored well away from tents, buildings and offices. Learn the workplace fire drill.

If a bush fire approaches:

- ¥ Contact the local bush fire brigade, land holder and your office or base.
- ¥ Sound the alarm to warn camp members.
- ¥ Wet down all buildings, etc.
- ¥ Evacuate the area if safe to do so, if not —
- ¥ Remain inside a building or a large cleared area or a large dam until the fire front has passed.

After the fire front has passed (10 - 15 minutes) go outside and put out the small fires which may have started. Only do so if it is safe.

If you are in a vehicle and get caught in a bush fire:

- ¥ Do not drive through flames or thick smoke.
- ¥ Drive away from the fire.

If you cannot escape:

- ¥ Stop your vehicle in a clearing or area of low vegetation.
- ¥ Turn off the ignition.
- ¥ Remain in the vehicle with all vents, windows and doors shut.
- ¥ Cover yourself with a blanket, towels etc and lie down below window level.

If you are on foot and get caught in a bush fire:

- ¥ Move across the slope away from the fire front, then down slope towards the rear of the fire.
- ¥ Look for a burnt out area to safely cross the fire front.

If you cannot escape the fire front:

- ¥ Look for a burnt out area to safely cross the fire front.
- ¥ Lie down behind a bank, log or in a hollow or dam or stream until the fire front passes.
- ¥ Where possible cover yourself to protect yourself from the fire's radiant heat.

GUIDELINES FOR FIELD CAMPS

If possible, every substantial field camp must be as close as possible to an airstrip which the RFDS could use. Some large station/property airstrips are in this category and have the advantage of being known to the RFDS.

Recommended practice for a safe camp includes:

- ¥ Choose a camp site and layout which provides acceptable standards of safety and hygiene minimises the risk from fire and flood.
- ¥ Sites should be reasonably level, with a few shade trees, but with a minimum of tree stumps and timber.
- ¥ Camps should not be placed among trees which will shed branches.
- ¥ Sandy to gravelly ground is preferable to clay soils which will break up with traffic and become dusty in dry weather or muddy from rain.
- ¥ Vehicle access tracks should be down wind of the camp, to avoid dust from vehicles. It may be necessary to rope off a large camp to keep vehicles and their dust away from the camp.
- ¥ Larger camps should have a separate vehicle and fuel storage park, safe from bush fires.
- ¥ If possible, the site should be easy walking distance from a water supply, and upstream from pollutants.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

All Australian Departments of Mines regard mineral exploration tenements as **mines** from a safety point of view. Therefore ,appropriate PPE must be worn at all times whilst on site.

Footwear

Steel capped boots must be worn when working around drill rigs, earth moving equipment, using heavy tools such as sledge hammers, chainsaws etc. This is a mandatory requirement on most mine sites.

For traversing and field work, hiking boots that provide good ankle support and traction are recommended.

Gaiters protect your feet and lower legs from various hazards including snake bite, stakes left by track cutters, low scrub and spinifex. Long pants will also provide some protection.

Hearing Protection

Helicopter engines, chainsaws and drilling equipment frequently result in exposure to noise levels in excess of 85 decibels. The louder the noise, the shorter the duration necessary to damage your hearing. To prevent hearing loss use the hearing protection that is provided. **Ear muffs and ear plugs are supplied for your protection, make sure you use them. Hearing protection must be worn within 50 metres of all working drill rigs** or whenever you use a chainsaw or core saw.

Eye Protection

Protect your vision whenever you perform a job that might endanger your eyesight. Wear safety glasses with eye shields whenever you:

- ¥ strike rocks with a G pick.
- ¥ operate a chainsaw or core saw.
- ¥ **work within 50 metres of a working drill rig.**
- ¥ handle hazardous chemicals or materials.

Wear safety sunglasses whenever you work in conditions that expose your eyes to extra amounts of ultraviolet light.

Hard Hats

Wear an approved hard hat whenever you work in situations that present danger from falling or flying objects such as:

- ¥ **within 50 metres of a working drill rig.**
- ¥ in pits, trenches and costeans.
- ¥ sampling at cliff faces or on steep slopes.

Dust Masks (Respiratory Masks)

Use dust masks to protect your lungs from airborne fumes and dusts.

Dust masks must be worn within 50 metres of an operating RC drill rig when ANY dust is present. Whenever the core saw is used or when working in dusty environments.

Clothing

The type of clothing that is suitable for field work depends on climatic conditions and terrain. Clothing should be visible and provide protection from various environmental hazards. These include heat, cold, rain, snow, UV radiation and insects. Always carry wet weather gear and warm clothing when working in high altitudes as the weather can deteriorate rapidly. Wool retains warmth when wet. Down provides insulation only when dry. Cotton is an excellent material for warm and humid climates but not suitable for cold conditions.

Skin Protection

VIEPS supports the Sun Smart Policy with its slogan *Slip, Slop, Slap* sun blocks and insect repellents are available.

Wide brimmed hats will be provided and should be worn at all other times when not working near mobile earth moving and drilling equipment. As added protection from the sun, it is recommended that all personnel working in the field wear long sleeved shirts and long trousers.

SAFE USE OF TOOLS

Hand tools are to be kept in good condition. Use the right tool for the job. Keep cutting tools such as axes, saws and chisels sharp. When using tools wear the appropriate PPE.

All portable electrical equipment will be checked before use. Check the equipment, the attached cords and the extension cords for wear and damage. Do not use if worn or damaged. All portable electrical equipment should only be used whilst it is within its tagged inspection date.

Users of portable electrical equipment will be protected by the use of Residual Current Devices (RCD).

Chainsaws must only be used by trained and suitably qualified operators.

Portable welders will only be used by trained and suitably qualified operators.

Equipment that has been tagged out of service by having a DANGER tag or OUT OF SERVICE tag is not to be used or operated until the tag has been removed by the person who placed it or by the manager on site after corrective measures have been taken.

HOUSEKEEPING AND HYGIENE

University staff and students are expected to maintain a high standard of personal hygiene. Before meal breaks, every effort should be made to wash mud, slurry and oil, etc., from hands and faces.

MANUAL HANDLING

Manual handling is any activity requiring the use of force exerted by a person to:

- ¥ lift
- ¥ lower
- ¥ push
- ¥ pull
- ¥ carry or otherwise
- ¥ move
- ¥ hold
- ¥ restrain

a person, animal or thing.

To reduce the incidence of back strain:

- ¥ the task should be planned before work begins;
- ¥ suitable protective clothing should be provided and worn;
- minimise double handling;
- ¥ take rest breaks during heavy or repetitive work;
- ¥ store heavier objects at waist level, smaller objects on high or low shelves;
- ¥ lighten loads (break loads into smaller quantities);
- ¥ reduce bending, twisting, reaching movements;
- ¥ use two people to carry bigger loads; and
- ¥ prevent muscle strain and fatigue. This includes warming up before working, allocating time for rest breaks, and allowing time to gradually get used to a new job.

Backstrain

Statistics show that most of the victims of back strains are below the age of 20 or above the age of 60. This points to inexperience and lack of supervision and training in the former group, and to an accumulation of minor damage and decreasing physical resilience in the latter. As a rough rule of thumb, persons should not lift unassisted, weights greater than about 20 kg.

Observation of the few golden rules of lifting listed below could dramatically reduce the rate of back injuries.

DOs

- Bend the knees, but not beyond a right angle.
- Keep the back straight but not vertical.
- Lift using the strong thigh and calf muscles.
- Keep the centre of gravity of load and body in line with the feet.
- While carrying, clasp the load close to the body.

DO NOTs

- Do not turn the body or head while lifting. Lift, then pivot on feet.
- Do not jerk or snatch. Slowly accelerate the load.
- Do not use the weak back muscles to lift.

Chapter 9

Environmental Procedures and Guidelines

Fieldwork, if thoughtfully and carefully carried out, should have a minimal impact on the environment.

VIEPS supports the concept of sustainable development. That is meeting the needs of this generation without closing off options for future generations. Our objective is to manage the development of resources together with the protection of the environment.

WEEDS

Care should be taken to not spread noxious weeds.

- ¥ All earthmoving machinery should be routinely washed to remove all clods of earth and seeds when moving from one location to another. Vehicles should also be washed.
- ¥ Weeds found growing in rehabilitation areas should be removed by digging or poisoning with an appropriate herbicide.

TRACKS

One of the most visible evidence of exploration activities is track building. Track construction and rehabilitation is very expensive. Tracks, drill sites, grids, trenches and camp sites all need to be carefully considered prior to the exploration program to minimise their environmental impact.

- ¥ Walking short distances is always the preferred option.
- ¥ Always use an existing road or track in preference to building a new one.
- ¥ Establish the ownership and/or the controlling authority of roads before use, and where appropriate, obtain permission before use.
- ¥ Respect existing roads/tracks —**do not accelerate their deterioration** by use of excessive speed, oversized or overloaded vehicles. Do not use in wet weather conditions.

Leave gates as you find them.

Track Construction

- ¥ Use available maps or aerial photos to determine possible routes for the new track before checking in the field.
- ¥ Where removal of trees is unavoidable, consider routes which minimise tree clearing.
- ¥ Generally the best track locations will be found on ridge tops or on bottom slopes just above the valley floor. Keep off valley floors, as drainage can be a problem in these locations.
- ¥ Fit the track to the topography so that the earthworks will be kept to a minimum.
- ¥ Try to position tracks along the contour and avoid sudden changes in gradient.
- ¥ When the new track comes off an existing roadway ensure the junction is discrete but safe. Traffic must have a clear view of the junction.
- ¥ The angle between the track and the road way should be large. The track should include a dog leg in the bush, close to the road way to reduce its visual impact.

- ¥ All water courses are protected by stream side reserves, therefore tracks built parallel to water courses should be some distance from the water course.
- ¥ Minimise creek crossings.
- ¥ Where possible creeks should be crossed at a right angle to minimise disturbance to the stream side reserve.
- ¥ Do not use creek floors as tracks.
- ¥ Talk to the local earth moving contractors about the local conditions.

Chapter 10

Appendices

APPENDIX A: *Example of a Risk Assessment*

Activity	ESC3162 Fieldtrip to Bendigo
Period	10 October 2001
Participants	Reid Keays (Leader), Mary Jane (Safety Officer), Jess Trofimovs, Dorte Hansen 15-18 Undergraduate Students
Responsible Officer	Reid Keays
Qualified in First Aid,	Mary Jane, Jess Trofimovs, Dorte Hansen

Risk Description	Prob.	Sev.	Matrix Value	Management Strategy	Resources/Planning
Accident while travelling in School of Geosciences bus (12 seats), Troopie (8 seats) and Camry (4 seats). Approximately 400 km will be travelled during the day, on sealed roads.	D	4	Med	Vehicles driven by experienced drivers from School. Participants to be instructed to use seat belts	First-aid kit in vehicle. Appropriate assistance will in first instance be given by first aider; police/emergency personnel/ qualified medical practitioner will be contacted by mobile phone
Injury due to slipping/falling or being hit by falling objects while working at base of steep slopes at two road side stops as well as at adit entrance at Bendigo Mining mine site	C	3	Med	Participants to be instructed to wear strong shoes providing good grip, and warned to keep away from steep banks/cliffs Safety officer to inspect rock faces before commencing work; students instructed to avoid any unsafe area Hardhats to be worn while at mine site and other areas where there is a danger of falling objects	First-aid kits to be carried by demonstrators. Phone contact available to local authorities
Injury due to being hit by passing vehicles at two road side stops	D	4	Med	Participants instructed to stand off roads at all times, except when crossing Two lookouts will be appointed to enforce this instruction, and to watch for any vehicles	First-aid kits to be carried by demonstrators. Phone contact available to local authorities
Injury while visiting Bendigo Mining NL site office and viewing adit entrance	D	3	Med	Hardhats to be worn At all times when on site Participants to be made aware of dangers	To follow Bendigo Mining NL Safety procedures
Injury while visiting Central Deborah underground tourist mine	D	3	Med	Hardhats and appropriate footwear to be worn Participants instructed to abide by rules of Central Deborah tour guide at all times	To follow Central Deborah Gold Mine Safety procedures
Bushfire	E	4	Med	Not in bushfire season, but will monitor situation on day.	Compliance with fire bans. No smoking in field.

Medical Emergency	D	4	Med	Information on any known common problems (e.g. asthma, allergies to stings) to be sought prior to trip.	Mobile phones to be carried (see above).
Snake bite.	E	3	Low	Not in the high risk period for snake encounters. Care to be taken when walking on inland paths	First aid treatment. Victim to remain stationary and paramedic will be called by mobile phone.
Exposure to cold or heat	D	3	Low	Participants to be advised to bring suitable clothing: warm and waterproof clothing for cold + wet conditions. Hat and sunscreen for hot conditions. Shade available at most sites. Situation will be monitored during day and trip shortened in cases of too cold / wet weather	Sunscreen to be carried for group. All participants to carry water. Student information to have relevant details.

To be carried: First aid kits
Mobile phones
Sunscreen
Water

Matrix Interpretation

Probability	Risk				
	Insignificant (1)	Minor (2)	Moderate (3)	Major (4)	Catastrophic (5)
Almost certain (A)	High	High	Critical	Critical	Critical
Likely (B)	Med	Med	High	High	Critical
Possible (C)	Low	Low	Med	High	Critical
Unlikely (D)	Very low	Low	Low	Med	High
Rare (E)	Very low	Very low	Low	Med	High

Impact/Severity

Critical and High: Treatment Plans to be developed, implemented and reported to Dean/Divisional Director and Vice-Chancellor

Medium: Treatment Plans to be developed and implemented by operational managers

Low: Acceptable — managed by normal control procedures

Very low: Negligible — no action required

APPENDIX C: *Survival Kit*

The following is a suggested list of equipment that should be sufficient to provide you with the basic requirements for survival.

Item	Uses
Suture kit	¥ Sutures, sewing, fishing
Can opener	¥ Opening of containers etc
Hacksaw blade	¥ Cutting metal, bone, wire etc
Plastic bags	¥ Ground sheets, raincoat, shelter, water collectors/carriers, carry bags, flotation
Scalpel blade	¥ As knife, general purpose
Fishing net	¥ Fishing net, carry bag
Alfoil	¥ Frying pan, water containers, signalling
Surgical rubber	¥ Sling shot, long drinking straw
Bush saw	¥ Cutting saplings, bone
Canvas tape	¥ Repairs to plastic bags, Alfoil, clothing, band aid
Pencil and notepaper	¥ Write diary each day, messages
Condom	¥ Water container, flotation
Nylon cord	¥ Fishing and snares
Trace wire	¥ Snares, fishing, etc
Beef stock cubes	¥ Sustenance
Metal containers	¥ All purpose, cooking, digging, etc
Rescue blanket	¥ Tent, groundsheet, water procurement, sleeping bag, reflector sheet, signal mirror
Vitamin tablet	¥ To supplement food supplies
Waterproof matches	¥ Fire lighting
Condy crystals	¥ Medicinal, water purification, fire lighting
Water purifying tablets	¥ Water purification
Fishing gear	¥ Fishing, snares
Barley sugar	¥ Energy, fire lighting
Band aids	¥ First aid
Panadol	¥ Pain killer

Field First Aid Kits, and Instructions for Use

Instruments:

- 1 pair scissors
- 1 pair fine tweezers
- 1 splinter remover
- 3 scalpel blades

Medications and Solutions:

Item	Uses
1 × 24 tabs Panadol or Paracetamol	¥ Aches and pains
1 × 20 tabs Aspirin	¥ Aches and pains, reduce localised swellings
1 × 24 Dequadin lozenges	¥ Sore throat or mouth
1 × 24 tabs Mylanta	¥ Upset stomach
1 × 250 ml Cetavlon	
1 × 250 ml Tinc.Benz. Co.	¥ Forms a skin on areas difficult to bandage
1 × 250 ml Calamine lotion	¥ Insect bites
1 × 250 ml Icthammol and Glycerine	
1 × 250 ml Ungvita	
1 × 250 ml Linctus Camphor Co.	¥ Coughs
1 × 250 ml Mist Bismuth	
6 × 30 ml tubes 0.9% Sodium Chloride eye stream	¥ Eye wash
2 × 20 tabs Tannalbin	¥ Diarrhoea
2 × 10 capsules Karvol Decongestant	

Always follow the directions on the packages.

Dressings:

- 1 box Telpha non-stick dressing
- 1 roll Fixomull adhesive tape
- 3 rolls Elastoplast tape
- 1 box assorted Handyplast
- 3 pkts eye pads
- 1 pkt Handy gauze swabs
- 6 large field dressings
- 6 cloth triangular bandages (slings)
- 1 large cervical collar
- 1 pkt Steristrips
- 36 Kling bandages
- 12 × 7.5 cm crepe bandages
- 12 × 15 cm crepe bandages
- 2 pkts surgical rubber gloves

APPENDIX D: VIEPS Field Vehicle Equipment Check List

Equipment on Vehicle	Comments
TOOL KIT	
Side cutters	
Socket set	
Shifters (2)	
Spanners	
Screwdrivers (3)	
Allen wrenches	
Razor blades (2)	
Hacksaw blades (2) and hacksaw	
Tie wire (1 roll)	
Duct tape	
Hose clamp (2)	
Leather gloves	
Radiator sealant	
Spray lubricant	
Jumper cables	
Lug wrench	
Radiator hose (spare)	
Belts suit (HJZ 7S)	
Fuel Filter	
Shovels (1 long handle, 1 short handle)	
Snatch strap (2 shackles)	
Hi Lift jack	
Cabin brush	
Octopus straps (2)	
Fuel funnel	
Rubber tubing	
Crimping pliers and 10 terminals	
Alligator clamps (6)	
Steel mallet	
Vice grips	
Pliers	
Cold chisel	
TYRE REPAIR KIT	
Wire brush	
Tyre levers	
Bead breaker	
Spare inner tube	
Tube patch kit (patches, glue and raker)	
Tyre pressure gauge	
Valve tool	
Valves	
Wheel brace (spare)	
Rubber mallet	

Equipment on Vehicle	Comments
FIELD AND PROCEDURES MANUAL	
General/Search/Survival procedures	
Telephone and address directory	
Station owners Telephone numbers	
Road mpp	
Maps of current project areas	
Australian Bush Survival and Search Rescue	
ADDITIONAL EQUIPMENT	
Satellite Phone	Test weekly
UHF radio	Test weekly
Dual battery system with isolator switch	
Water tank (stainless steel, full)	Full
Bull bar	
Two spare wheels	Check Pressure
Roo jack	
Water bottle - full	
Electric compressor - wired into vehicle	
Spare compressor - foot or lighter operated	
Electric winch (1 per project)	
Emergency Ration Pack	
Fire extinguisher	
Pump pack sun screen	
Toilet Paper	
Signalling mirror	
Food	
Matches (dry container)	
Torch	
Warm wrapping (e.g. sleeping bag)	
VEHICLE FIRST AID KIT	

Signature _____

Date _____

Chapter 11

Acknowledgements

This document was prepared from the Pasminco Manual Safety & environmental procedures & Guidelines for Field Operations. VIEPS is indebted to Pasminco for making its manual available.

Information in the Pasminco Manual was derived from the following sources:

- MIM Exploration Safety Manual, 1998
- BHP Exploration Department Safety Manual, 1994
- Rio Tinto Exploration Pty Ltd Safe Work System, 1998
- Helicopter and Fixed Wing Safety and Operations Handbook Rio Tinto Exploration Pty. Ltd., 1996
- Australian First Aid 2nd edn., vol. 1, St Johns Ambulance Australia, 1996
- Guide to Safety and Survival RFDS Queensland Section, 1998
- Australian Bush Survival Skills and Search Rescue Manual S. Radusin (ed.), 1992
- Field Geologists Manual 3rd edn., published by the AusIMM
- Mineral Exploration Code of Practice 3rd edn., Industry Safety and Mines, Tasmania, 1995
- Exploration Safety Guidelines Department of Mines and Energy, Qld., 1998
- Manual Handling Guidelines WorkSafe, Western Australia Commission, 1998

Chapter 5, Small Water Craft was taken from:

- NARE Antarctic Field Manual 3rd edn., 1987