



Australian Speleological Federation

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ASF Cave Safety Guidelines

Adopted 1999

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See the ASF [Leadership, Safety and Risk Management](#) page for Accident/Incident form.

Important Cautions

Please read EACH of the following important messages BEFORE reading the Cave Safety Guidelines:

Liability of ASF, etc.

If you visit any cave, canyon, cliff or karst area or feature, YOU DO SO ENTIRELY AT YOUR OWN RISK.

Caving, cave diving, canyoning, single rope technique and other like activities are INHERENTLY DANGEROUS AND RISKY ACTIVITIES.

YOU SHOULD NOT RELY ON THE Cave Safety Guidelines.

Notwithstanding anything in these Guidelines or any other guidelines or document, any representation or anything else, the Australian Speleological Federation Inc., its servants, officers, members and agents SHALL NOT BE LIABLE for any of the following:

(a) any NEGLIGENCE in the preparation, adoption, publication, re-publication or other promulgation of these Guidelines;

(b) any loss, damage, injury, death, accident or other misadventure arising out of, sustained during or as a consequence of, or in any way relating to any act(s) or omission(s) occurring during or prior to any visit to any cave, canyon, cliff, or karst feature or area; or

(c) any consequence of any failure properly to have regard to and understand these important cautions.

In each of these important cautions, "these Guidelines" shall be deemed to include every copy, draft or revision of these Guidelines, and any copy or part thereof.

If you do not completely understand these important cautions, you should seek your own, INDEPENDENT LEGAL ADVICE.

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Introduction

As cavers we enter an environment that provides physical and mental challenges and the satisfaction of personal discovery. It is also an environment that can be unremitting in its hostility to the unprepared, incapacitated or injured. Emergency medical support that is readily available to participants in other regional activities may take many hours to get to a casualty in a cave. Getting such aid to the casualty is only the start to what can often be the long and difficult task of returning the injured person to the surface.

Risks can be reduced to acceptable levels but never eliminated. The way to minimise risks is to undertake caving with an attitude of self-reliance, responsibility and preparedness. In practical terms this means careful planning, competent organisation, appropriate provisioning and thorough training.

1. General

1.1 Minimum independent party size is four. This is the smallest group that is able to muster sufficient physical resources for effective self rescue and provide adequate care should a member become injured or incapacitated.

1.2 At least one member of the party should hold an approved first aid certificate and all members to know basic emergency procedure in case of an accident.

1.3 Every member of the party should know the correct procedure to follow in summoning help in an emergency.

2. Planning

The points under this heading are the sorts of things a good leader would consider, irrespective of the scale of the trip. When planning more ambitious trips, the procedure would be formalised by discussion with deputy leaders and other party members; whereas on more routine trips these points would be covered almost as a mental check list.

2.1 Determine what known hazards exist in the cave(s) to be visited.

2.2 Notify any 'local' speleological groups of the trip intentions, giving sufficient notice so they can assist in identifying any hazards or needs for special equipment.

2.3 Decide minimum equipment requirements (including emergency equipment and provisions), in the light of expected hazards and what you plan to do in the cave. Consider if you have sufficient equipment available for the trip or will the

scope of the trip need to be revised.

2.4 Ascertain the levels of knowledge, skill and physical abilities of all intending trip members.

2.5 Determine the extent of self-rescue that could be effected by the party with the equipment available and the time delay to be expected before a full rescue operation could be expected in case of mishap.

2.6 Having regard for the items above, consider the need for 'lead up' training for members, especially if attempting demanding caves in remote areas.

2.7 Identify members to act as second or deputy leaders in case the party has to be split.

2.8 Decide under what circumstances the party will be split.

2.9 Determine critical factors that would mean abandoning the trip or turning back e.g. weather conditions.

2.10 Decide at what stages of a trip (especially long trips) assessment of continuing or turning back is to be made.

2.11 Decide on communication procedures to be used underground.

2.12 Decide expected time for completion and route to be followed. Add a factor for unexpected delays and nominate a realistic return time as well as a 'commence search and rescue' time.

2.13 Leave trip details with the appropriate responsible authority for the region where the trip is planned.

3. Party Leader's Responsibilities

3.1 Ascertain that each member of the party has the knowledge, abilities, skill and equipment to safely attempt the trip.

3.2 Conduct the trip in such a way that the party remains as an interconnected group and the leader is aware of each member's position and condition.

3.3 Ensure that members do not get into situations beyond their capabilities.

3.4 Check all equipment intended for use in hazardous situations for suitability and serviceability before every trip.

3.5 Ensure all members know the accepted communications procedures and calls before each trip. (see ['Climbing and Calls'](#))

4. Team Member's Responsibilities

The points under this heading are the sorts of things a team member would consider, irrespective of the scale of the trip. When planning more ambitious trips the procedure would be formalised by discussion with the leader or deputy leader.

4.1 To inform the party leader: a) of any medical condition that may affect performance. b) if under any medication, detail dosages, times to be take, location of medication among equipment, and effects if dosages are missed.

4.2 Do not enter a cave if under the influence of alcohol or other performance-altering drug. 4.3 Indicate any uncertainty about procedures or equipment use before entering a cave.

4.4 Know how to use all the safety/vertical equipment needed for the trip.

4.5 Inspect rigging and associated vertical equipment before using. (You have the right to ask for extra back-up, or re-rig the pitch after consulting with the party leader. Any re-rigging must be checked and OK'd by another party member, ideally the leader or the person who did the rigging.)

4.6 Ensure that you are properly equipped for the trip.

4.7 Accept that the party leader has the final decision as to who is considered properly equipped, trained and physically fit to be included on the trip.

4.8 Accept that the party leader may request to inspect personal equipment and provisions for suitability.

5. Above Ground Organisation

5.1 The following items should be within easy reach of the cave entrance:

- a) Fully equipped first aid kit.
- b) A sleeping bag and sleeping mat.
- c) Food, fuel stove, and water.
- d) Tent (which can be erected in the cave).

5.2 All members of the party must be able to gain access to cars carrying support equipment.

6. Equipment to be Carried Underground

6.1 Mandatory personal equipment

- a) Helmet with rigid chin strap (ie not elastic).
- b) Reliable and independent primary and secondary light sources, which should be carried on the person at all times.
- c) Adequate clothing for cave attempted.
- d) Adequate footwear - boots are recommended.
- e) Waist tape (5m x 50mm webbing is recommended). f) Small first aid kit.

g) Whistle and penknife.

h) Spare globes & batteries.

6.2 Other recommended personal equipment

a) Third light source. b) Self-rescue hardware (ascenders & pulleys) if vertical caving.

c) Prussik loops.

d) Extra clothing.

e) Space blanket.

f) Triangular bandage and/or compression bandage.

6.3 Mandatory party equipment (should be carried by the leader):

a) First Aid Kit - leave at the entrance or in the car for short trips; take along on longer trips.

b) Food and water if the cave warrants it.

c) Notebook and pencil.

d) Rescue rope and hardware (ascenders & pulleys) if vertical caving.

e) A watch.

f) Pocket knife (Swiss army instant repair kit!).

7. Climbing and Calls

* Note that most caving accidents are falls from unbelayed climbing.*

7.1 Any member of a caving party always has the right to request and receive a safety line.

7.2 Safety lines (belays) should be used on all pitches where a ladder is more than just a hand-hold.

7.3 There should only be one person at a time on a climb.

7.4 Climbing calls should always be used. The Party Leader should ensure that everyone understands and agrees on proposed calls before going underground. Recommended calls are the "UP, DOWN, STOP" system, as detailed:

"UP" means "I want to come up", "take up slack", "haul up", etc

"DOWN" means "I'm coming down", "pay out more rope", etc "OK" should be used for any affirmative.

"STOP" means quit whatever you are doing - stop feeding out line, stop hauling up, stop ascending, hold line taut - and wait for further communication.

"BELOW!" is a warning that anything is falling down toward those below. It does NOT mean "look up"!

An example is as follows:

Climber: "UP" or "DOWN" as appropriate (meaning 'I want to come up/down')

Belayer: "OK" meaning 'on belay, come up/down' Climber: "SAFE" when finished climbing & off safety line

NB: The word "slack" should NOT BE USED in calls, as it is ambiguous, and could mean either "up" or "down". Similarly for the word "rope", which is also ambiguous.

7.5 Whistle signals should be used on pitches where voices cannot be heard (e.g.. near waterfalls). If different whistle signals are used because of 'local rules', each member of the party should be told what the communication will be before entering the cave.

Recommended signals are:

One blast STOP

Two blasts UP

Three blasts DOWN

Four blasts OK/SAFE

One very long HELP!

8. Single Rope Techniques

8.1 Minimum skills required --

8.1.1 Any person engaging in vertical caving must be able to tie the following knots"

- a) Tape knot
- b) Figure Eight
- c) Double Fisherman's
- d) Prussik knot

8.1.2 All SRT cavers should be able to tie and use a two-knot prussik system for use in emergencies.

8.1.3 Cavers must be familiar with equipment and be able to demonstrate proficiency in the following:

- a) Fitting of SRT harness and correct attachment of equipment.
- b) Crossing re-belays, rope-protectors and re-directions.
- c) Changing from descent to ascent and vice versa. d) Crossing knots - both ascending and descending.

8.2 Equipment --

8.2.1 A spare (emergency) rope should always be available when engaging in vertical caving.

8.2.2 Each member of the party should have their own personal equipment - sharing is unacceptable.

8.2.3 A helmet with a four-point attachment CHINSTRAP should be worn for any vertical work, whether above ground or below. A construction worker's helmet is not suitable for SRT work.

8.2.4 Gloves should always be worn when engaging in SRT work.

8.2.5 A knife and whistle on a breakable lanyard should be carried when engaging in vertical caving.

8.2.6 Both ascending AND descending equipment should always be carried, irrespective of which direction you are heading. The gear should be so arranged that it is ready to be used to reverse direction without delay.

8.2.7 Two or more ascenders must be attached independently to the seat harness in an ascending rig, such that if either fails or is accidentally disengaged, the caver will remain upright.

8.2.8 There must be TWO POINTS OF ATTACHMENT AT ALL TIMES when ascending. Therefore, a third ascender/cowstails should be used when crossing rebelay, rope protectors, or transferring to tails at pitch tops.

8.2.9 For abseiling, the use of variable friction devices is recommended, such as rappel racks and bobbins. Figure 8, Harpoon devices and the "classic" style are NOT recommended.

8.2.10 If karabiner/brake-bar devices are used, then a large steel screw-gate karabiner and extended length piton should be used.

8.3 Safety Checks/Procedures --

8.3.1 Long hair must be tied back for vertical work and jewellery should be removed.

8.3.2 Rigged ropes should have a knot tied in the end to prevent accidentally abseiling off the end. A double Figure-8 with a loop large enough to put your foot in is recommended.

8.3.3 Every person descending a pitch should check the rigging for soundness. Pay particular attention to anchor points, karabiner gates, knots, rope protection and free hang.

8.3.4 Calls should be used for both ascending and descending.

Recommended code is:

Descending

Abseiler: "DOWN" When abseiler is clipped into rope and ready to descend

Belayer: "OK" When bottom belayer is ready. If belay is not being used, then "buddy" gives this response.

Abseiler: "SAFE" Once unclipped from rope and clear of the pitch bottom.

Ascending

Ascender: "UP" When caver is attached to rope and wishes to ascend.

"Buddy": "OK" If safe to ascend.

Ascender: "SAFE" To cavers at bottom when ascent is complete and caver is off rope and clear of pitch head.

9. Caving in Foul Air

9.1 General Comments

Foul air is an atmosphere which contains greater than 0.5% CO₂ and/or lower than 18% O₂ by volume.

Brief exposure to foul air will cause a rapid increase in the heart and breathing rates.

Prolonged exposure may have some or all of the following effects on party members:

- a) Increased heart and breathing rate
- b) Lack of attention to details
- c) Clumsiness
- d) Fatigue
- e) Anxiety
- f) Severe headaches and in some cases nausea

Exposure to atmospheres containing greater than 6% CO₂ and/or less than 11% O₂ can result in unconsciousness with prolonged exposure - leading to suffocation and death. These gas concentrations may vary a couple of percent, depending on the tolerance of the individual, however nobody is immune to the effects of foul air.

The above physiological signs are a good indication of foul air. The flame extinction test is a simple test which can confirm the presence of foul air which is dangerous to human life. The relative O₂ concentration by volume that will cause a flame to extinguish is approximately 15% or less. In general a low O₂ concentration which will not support combustion is associated with an elevated CO₂ concentration. An elevated CO₂ concentration is generally the most life threatening foul air scenario found within limestone caves. The flame test can be undertaken by lighting a match or butane cigarette lighter or carrying a lit candle into suspected foul air. If the flame is extinguished, foul air is present. Where possible a butane cigarette lighter should be used to reduce unpleasant fumes emitted from matches burnt by people testing air quality in the confines of a cave.

9.2 As soon as foul air is suspected, a test should be made by striking a butane lighter. If it will not remain alight, then the party should immediately begin to exit, but should NOT PANIC OR RUSH.

9.3 If ascending vertical pitches, great care and thorough checking should be carried out to ensure equipment is properly attached.

9.4 If abseiling into a cave suspected of containing foul air the following procedures should be followed;

- a) The first person down should use a trailing ascender held open or a similar device which will lock if the person is overcome by foul air. Alternatively the person can be slowly lowered by a single top rope.
- b) The abseil or lowering rope must be able to be changed to a retrieval system in the event that the abseiler is overcome by foul air.
- c) The first person down the pitch should have foul air experience. They should make regular checks by stopping and lighting a butane lighter every few metres of descent and communicate constantly with those above.

9.5 Beginners or other suffering fatigue and /or anxiety should be guided, watched and encouraged until out of the cave.

9.6 All cavers, and most particularly Party Leaders, should recognise the fact that exposure to foul air has an effect on a person's ability to function normally. The likelihood of an accident is therefore greatly increased. All care and precautions should be taken.

9.7 Under special circumstances such as search and recovery operations, exploration and scientific work, it may be decided to enter into foul air deliberately. Under such circumstances the following is recommended:-

9.7.1 In mild foul air where breathing rate is up

a) A CO₂ tester should be carried - if nothing else is available, use a lit candle or frequently test with a butane cigarette lighter. If the flame goes out - get out slowly.

b) Cavers with no experience of foul air should be introduced to it gradually by an experienced leader.

9.7.2 In foul air where the flame test fails only experienced foul air cavers should enter these regions. In addition to the recommendations in 9.7.1;

c) A CO₂ tester must be carried eg. a Draeger Gas Analyser.

d) An "oxygen rebreathing" apparatus should be taken (one kit to four people). The rebreather set should go down the cave with the first person.

9.7.3 In cave atmospheres containing greater than 6% CO₂ and/or less than 11% O₂, self contained breathing apparatus is necessary and all the precautions against equipment failure taken in mines rescue and cave diving should be followed.

10. Cave Diving

Cave Diving is defined as the diving of water filled passages/caverns using SCUBA or other supplied breathing apparatus, and guidelines. All persons attempting cave diving should be properly trained and certified by a body such as the Cave Divers Association of Australia (CDAA).

Safety Guidelines for cave diving are contained in the [ASF Cave Diving - Code of Practice](#) (1988).

11. Free Diving

Free diving is defined as breath-held diving of (relatively) short water filled passages, without the use of supplied breathing apparatus, and is most commonly practised in the "free diving of sumps". Just as with Cave Diving, the use of guide lines is mandatory.

Safety Guidelines for free diving are contained in the [ASF Free Diving - Code of Practice](#).