



## Australian Speleological Federation Inc. Safety Guidelines

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### 1. Introduction

As cavers we enter an environment that provides physical and mental challenges as well as 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, which is otherwise available to participants in other outdoor activities, may take many hours to reach a casualty in a cave. Obtaining and 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 equipment, thorough training, and co-operation between party members.

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Clubs and ASF Special Interest Groups (SIGs) should adopt their own safety rules to reflect their own circumstances. Such rules may be based on these Guidelines. The intention of safety rules should be to provide a set of actions that will move unacceptable risk to acceptable risk.

**See ASF Risk Management Policy and Risk Management and Emergency Procedures Guidelines 2020 for more detail.**

## 2. Definitions

### **Acceptable Level of Risk**

The level at which all participants are comfortable commencing or continuing the activity, knowing the risks involved. A low or moderate risk should be acceptable.

### **Activity (or Trip)**

All events which are organised and run by the ASF and its member clubs.

Some of these are: ASF conferences, caving trips, speleological trips, photography trips, cave diving trips, exploration trips, beginners' trips, expedition trips, training trips, Speleo sports, canyoning trips, and meetings.

### **Caver (or Member)**

A person on the activity.

### **Dependent members**

Members who are new to the activity who require guidance or instruction in the activity.

### **Caving Party (or Party)**

A group of members in a cave or on an activity.

### **Incident (or Accident)**

An accident is an event when a hazard has caused death, injury, or property damage. An incident is an accident, or is an event when a hazard almost caused death, injury, or property damage (a near-miss).

### **Incident Response**

Measures taken in anticipation of, during and immediately after an incident to try to minimise its effects. These measures may vary from a Party response, through a Club response, to a National response.

### **Risk or Hazard**

A Risk or Hazard is something which, if it happens, will have a negative impact upon the Party's objectives or a Member's objectives. This includes physical harm, or the loss of something of value. Risk is measured in terms of consequences and likelihood.

### **Trip (or Activity) Leader**

The organiser of the activity.

### **Party (or Cave) Leader**

The leader of an individual group of cavers. There may be several parties on an activity undertaking different activities within the same cave or in different locations.

### **3. Trip Planning and Preparation**

The Trip Leader plans the trip in consultation with the trip members.

When planning for caving activities ASF members must follow:

- the ASF Minimum Impact Caving Code,
- the ASF Code of Ethics and Conservation,
- The ASF Minimum Impact Code for Scientific Investigation in Caves and Karst.

Preparation should include utilising the:

- ASF Risk Management Policy and Risk Management and Emergency Procedures Guidelines and Safety Guidelines.

Trip planning needs to include:

- Understanding of the caving area, the caves to be entered and equipment required for the planned activities. Clubs that frequently visit an area may assume a greater role in sharing their knowledge of particular risks within that area. They are a good resource in finding out information relating to particular considerations (e.g. flooding danger, cave temperatures).
- Application for permits and land access.
- Minimum required experience, skills and fitness level of party members.
- Risk assessment and emergency procedures to be followed.

The minimum party size will vary depending on factors such as the size of the cave, experience of the party, and activity undertaken. For a party with dependent members, the minimum underground party size should be four with at least two experienced members. For parties of experienced non-dependent cavers, the minimum party size may be smaller.

The maximum party size will also vary depending on factors such as the size of the cave, experience of the party, and activity undertaken. Large groups can be cumbersome, and it can be hard for the leader to know what is happening and the status of the party members. This is very important in parties with dependent members, where the party size should not exceed twelve and where there should be at least one experienced member for every three dependent members.

Parties should have a designated leader. Another member may be nominated deputy leader in case the party decides to be split or in case of an emergency.

Clubs and SIGs (where considered appropriate) should have standards and methods to certify members as leaders. Leadership standards could include skills, knowledge and leadership ability. Leaders should have first aid, cave self-rescue skills and appropriate skills for the cave and intended caving.

It is preferable that all members of a party have training in first aid to an appropriate level set out in the Australian Qualification Framework. As a minimum one member should have a current qualification.

Clubs and SIGs (where considered appropriate) should have a system to train members. – in safe caving techniques (both horizontal and vertical)

Details of the intended activity should be left with a responsible person (call-out person) or an appropriate authority. This should include a realistic expected return time and a time to start search and rescue procedures (call-out time). The call-out person should know how to make the call-out, to make the call-out at the specified time and not to delay call-out. (“They’re just a little late so I’ll wait another few hours.”). It is better to start a rescue and cancel it than to needlessly delay rescue.

Cavers and surface support personnel need to be familiar with the procedures for overdue parties and for summoning help.

Party members should be briefed about the hazards likely to be encountered in the cave and on the surface. The briefing could include:

- objectives;
- equipment required;
- realistic duration;
- skills and abilities needed;
- emergency procedures; and
- Critical factors that would mean abandoning the activity e.g. high water levels, bad weather, hypothermia, CO<sub>2</sub>.

The level of knowledge, skill and physical abilities of party members should be determined prior to commencement of the activity.

Cavers visiting demanding caves or caving in remote areas should pay special attention to their skills and fitness.

Sufficient personal and party equipment must be taken on the activity. This may include emergency equipment and provisions appropriate for the expected duration, hazards and the activities planned.

All party members should make a continuous assessment if they and the other members are able to continue or need to end the activity. Any member of the party can end the activity. If the decision to end the trip is made, the party needs either to exit the cave together or, where there are sufficient participants, those who are unable to continue should return to the surface and should be escorted there if necessary. All members of the party must be consulted about this.

In an emergency, self-rescue is preferred rather than a full-scale rescue. The decision will be based on the nature of the emergency, the equipment and personnel available, and by the time delay before there is a full mobilisation of emergency personnel.

Other support items that a party may consider having available on the surface include:

- a comprehensive First Aid kit
- a sleeping bag, mat and shelter;
- food, fuel stove and water; and
- Communication equipment to contact the land owner or emergency services.

All members of the party must be able to access the support and emergency equipment. Equipment locked in a car with the keys underground is (almost) inaccessible.

#### **4. Party Leader's Responsibilities**

- To co-ordinate and organise the party. The party leader should have sufficient experience and skills to safely supervise the activity. In some cases, the party leader may be aided by a person more familiar with the cave or activity.
- To brief the party before starting the activity.
- To monitor safety and well-being of the party.
- To have the final decision as to who is appropriately equipped, trained and physically fit for the planned activity.
- To check all group equipment is serviceable and suitable for the planned activity. Unserviceable equipment should be repaired or discarded.
- To check the suitability of the personal equipment of any member who does not have sufficient experience to assess their own equipment.
- To use their experience to change or terminate the activity if necessary. This includes modifying the route, changing objectives, or making an early return to the surface.
- To assign tasks to members to help the party undertake the activity.
- To take control in an emergency by assigning tasks such as giving first aid, rigging and leaving for outside help.
- To report any accidents and incidents to the ASF Safety Convenor.

#### **5. Party Members' Responsibilities**

- To be aware in advance of the nature and risks of the activity and to have the knowledge, skills, fitness, and equipment to safely undertake the activity.
- To understand they are members of a team and they should be aware of other party members' locations and physical conditions.
- To inform the party leader when conditions are beyond their capabilities or comfort level.
- When appropriate, to tell the party leader and other party members, about any personal medical condition and, if under medication, its effects, location of

medication, dosage details, times to be taken, and effects on them if their medication is not taken.

- To keep confidential medical information of other members unless there is a medical emergency.
- Not to enter a cave or undertake an activity when they are under the influence of alcohol, recreational drugs or other medication that may affect their performance.
- To know how to use any safety or vertical or other equipment which they will need to use on the activity.
- Before they commit to the activity, to tell the leader any uncertainty they have about procedures or equipment to be used.
- To be responsible to ensure all their own equipment is serviceable and suitable for the planned activity (if they have the ability to do so).
- To inspect all rigging and associated vertical equipment prior to use. (A member has the right to ask for extra back-up, or to re-rig the pitch after consultation with other party members, especially the rigger.)
- To stop their participation in the activity for whatever reason. Should this occur, the decision must be told to the party leader immediately!

## 6. Personal Equipment

Each caver should have the following equipment:

- A **helmet** which can take a side load, has a non-elastic chin strap, is brimless, and which complies with a recognised standard for a climbing helmet such as AS1801, EN12492, EN397 or UIAA Standard (i.e. is not a construction helmet).
- Independent primary and secondary **light sources**. A primary light source is one or more lights giving sufficient light for 150% of the planned underground time. A secondary light source is one or more lights giving sufficient light for sufficient time to exit the cave if the primary light source fails. Light sources should be capable of mounting on the helmet and should not be carried in the hand. **Spare batteries** should be carried, depending on the nature of the light sources.
- **Suitable clothing** for the type of cave being visited.
- **Suitable footwear** with good grip. Soft-soled shoes are rarely suitable but may be needed in special cases.
- **Suitable gloves**. Depending on the cave they may need to protect the hands and the cave; and keep hands warm and dry.
- A **personal emergency kit** which could contain:
  - ✓ a thermal blanket,
  - ✓ a casualty accident report / observation form and a notebook and pencil,
  - ✓ a pocket knife (or scissors),
  - ✓ a whistle (if appropriate for cave conditions and with SRT),
  - ✓ a roll of electrical or sports tape or similar,
  - ✓ food and water suitable for the duration of the trip,
  - ✓ a watch.
- **Other personal safety equipment** depending upon the circumstances:
  - ✓ a waist tape with carabiner or short hand-line or extra rope,

- ✓ extra clothing such as thermal underwear, jacket or beanie.
- A “**Pee bottle**” or similar on extended trips.
- **SRT kit**, where required
- **Cave pack** with haul line.

- Suitable equipment for the surface part of the trip.

This could include:

- ✓ a rucksack
- ✓ extra water and food
- ✓ extra clothing suitable for the surface conditions (hats, raincoats, jackets etc)

## 7. Free Climbing and Ladder Climbing

Depending on the experience of the party, a hand line could be used on short free climbs. A belay rope may be used on short free climbs or ladder climbs and should be used on longer free-climbs and ladder climbs. **SEE Appendix 2 for communication calls.**

Any party member has the right to ask for a hand line or a belay.

On a free climb there should only be one person climbing at once. Other party members should keep away from the pitch head and pitch bottom (to minimise the effect of falling stones).

## 8. Single Rope Technique (SRT)

When planning an SRT trip, leaders should ensure participants have skills and experience suitable for the difficulty of the SRT. **SEE Appendix 2** for safety information on SRT and pull-thru trips.

## 9. Cave Diving

Cavers wishing to dive in an overhead environment (where there is no free surface), using supplied-gas breathing apparatus (e.g. SCUBA), must comply with the **ASF Cave Diving - Code of Practice.**

## 10. Free Diving

Cavers wishing to dive in an overhead environment (where there is no free surface), using a held breath (free diving), must comply with the **ASF Free Diving - Code of Practice.**

## 11. Toxic (foul) air

Cave air may have a higher partial pressure of carbon dioxide (CO<sub>2</sub>) than normal air. This is usually associated with a reduced partial pressure of oxygen (O<sub>2</sub>). **See Appendix 3 for more information**

## 12. Incident Responses

Refer to **ASF Risk Management and Emergency Procedures Guidelines.**

## Appendix 1: Communications

In vertical caving, a communications system, understood and used by all party members, is needed. On pitches where there is difficulty hearing voice or whistle calls (such as long or wet pitches), radio communication could be considered.

***Calls commonly used for free climbing, ladder climbing or abseiling, with a belay rope, and SRT.***

**GEAR CHECK** - Ask a party member to check that your gear is safe.

**ROPE BELOW** - A warning that a rope is about to be dropped down a pitch.

**ON ROPE** - The climber is now attached to the rope.

**ON BELAY** - The belayer is ready to belay the climber.

**TAKE IN** - The climber asks the belayer to 'TAKE IN' rope to remove slack.

**THAT'S ME** - The rope is tight to the climber and is not caught on an object.

**CLIMB WHEN READY** - The belayer acknowledges the climber's 'THAT'S ME' call and tells the climber that they may climb.

**CLIMBING** - The climber has heard the call '**CLIMB WHEN READY**' from the belayer and has started climbing.

**MORE SLACK or MORE ROPE** - The climber needs the belayer to pay out some rope to ascend or descend or to pass an obstacle.

**SAFE** - The climber has finished climbing and is stable and has moved to a safe area. The climber is still attached to the rope, but the belayer may now relax.

**OFF ROPE or ROPE FREE** - The climber has detached from the rope. At the top, this should only be called when the climber is safely away from the pitch head and cannot dislodge any debris onto party members below. At the bottom, this should only be called when the climber is safely away from the rope and cannot be hit by falling debris. Other party members may now approach the rope. The belayer may now start setting the rope for the next person.

**BELOW** - Something is falling; it may have been dropped or dislodged. **DO NOT LOOK UP**, tuck your head in and, if possible, cover your neck with your hands or quickly duck under an overhang or get as close to the wall as possible.

**RESTING** - The climber is having a rest. The belayer will keep the rope taught but not take in until told 'CLIMBING'. The belayer needs to be aware the climber may be tired and is at greater risk of falling.



**STOP** - There is a problem. All persons stop and listen quietly until the problem is fixed. Any party member may call 'STOP'.

**OK** - acknowledgement of an action

**PAST REBELAY** – On a pitch with multiple rebelay the progress of a caver both up and down the rope can be followed by the rest of the party using this call. If the rebelay are off-set, and it is safe to do so, other party members may follow the member on the pitch (in the same direction) once they are past a rebelay. Thus each member on the pitch is on a separate section of rope, separated by the rebelay.

Using **whistle signals**, such as:

- One short blast **STOP**
- Two short blasts **HAUL or UP**
- Three short blasts **OK or SAFE**
- One long blast **LOWER or DOWN**
- Three long blasts **OFF ROPE**
- Many blasts **HELP**

During ladder climbing, it is the responsibility of both the belayer and climber to ensure that the lifeline rope is kept taut at all times unless otherwise requested by the climber. The climber should not continue climbing if the lifeline becomes too slack.

## Appendix 2: Single Rope Technique (SRT)

SRT caving varies in technical difficulty. Leaders should ensure participants have the skills, fitness and experience suitable for the trip.

ASF recommends “Vertical” by Al Warild as an SRT reference:

<https://www.yumpu.com/en/document/view/3558301/alan-warild-cavediggerscom>

SRT cavers should be able to **tie these knots/bends**:

- tape knot for joining tapes,
- an end of rope knot (e.g. Figure 8 Loop, Figure 9 Loop),
- a rope joining knot (e.g. double Fishermans Bend or Figure 8 Bend),
- a mid-rope knot (e.g. Alpine Butterfly),
- a Prusik Knot,
- a belay knot (e.g. Italian Hitch (Munter Hitch)).

Persons learning SRT should **practice techniques** above ground before using them for the first time in a cave.

SRT cavers should **become proficient** in the following:

- fitting their SRT harness and safely attaching their equipment,
- changing from descent to ascent and vice versa, and
- Crossing re-belays, rope-protectors, re-directions and knots.

Each member of the party should have their **own personal equipment**; sharing is discouraged.

**Gloves** must be worn to protect hands while abseiling. Abseilers should not abseil at a rate where they do not have full control of their speed or which heats or damages equipment.

**Long hair** should be tied back, beards trimmed and loose jewellery removed. There should be no loose clothing.

Both ascending and descending equipment must always be carried. Unless there is a vertical rescue team present, persons should not abseil without ascending gear.

**Equipment** should be ready to be used to reverse direction, or to cross knots or re-belays or rope protectors, or to transfer to tails at the pitch head. This rule applies to abseiling-only trips (where the party is not going to return up the rope).

When ascending, there must always be at least two points of attachment between the sit harness and the rope or rebelay. Equipment needs to be arranged so that if the equipment fails the caver remains in an upright position.

For **abseiling**, a **variable friction** device, which does not have to be disconnected from the harness, is preferred. Examples include: Petzl Stop, Rappel Rack, Whaletail and Petzl Simple. Figure Eight, harpoon devices and the ***"classic" abseil style should not be used.***

**Rigged ropes** must have a knot tied in the end to prevent accidentally abseiling off the end. Often the first person to descend a pitch has excess rope in a pack that dangles below them.

Each person should **check the rigging**, especially anchor points, carabiner locking gates, knots, rub points, and for rope damage, and should adjust these where necessary. Each person should check their personal equipment, especially their harness, harness maillon and descender carabiner.

### **Pull-through trips:**

All the rules for SRT apply to pull-through trips.

A pull-through trip has special problems:

- Once the rope is pulled down the top pitch the party is fully committed to complete the trip.
- The rope has to be attached to the belay in a way that allows it to be pulled down.
- During the pull-down the rope can get tangled and jammed at the belay, or may be caught in a rock crevice, and may have to be abandoned.

As most cavers use single-rope abseiling, usually one side of the rope is used for abseiling and the other is used to pull the rope down.

Abseils should be rigged so that either rope can be used independently as far as is practical.

Leaders must ensure that **participants understand** the principles and techniques of pull-through trips. It must not be assumed that these are known by skilled vertical cavers as many do not have experience of vertical through trips. A **demonstration** at the first pitch should occur if there are any doubts.

At least one length of rope longer than the longest pitch needs to be carried. Total rope carried must be twice the length of the longest pitch.

If any member is intending a double rope abseil, then there must be either two ropes longer than the longest pitch or one rope at least twice the length of the longest pitch.

All abseilers should use cow tails and should **test the abseil** and rigging before they unclip the Cows Tail.

The jamming knot must be significantly larger than the hanger, maillon or ring through which the rope runs.

The jamming knot should have a loop and a carabiner attached through this loop onto the belay. This ensures that the rope cannot pull down if a party member abseils the wrong side of the rope.

The last person down a pitch should be experienced in pull-through trips. They must remove the safety carabiner or Stein knot before abseiling.

The second-last person should separate the two ropes while abseiling to ensure they do not wrap around themselves. At the bottom this person should have the two rope ends moved apart and a person dedicated to hold the pull-down rope.

A test of the pull down should be done before the last person descends to reduce the chances of a rope hang-up, where the rope becomes jammed and retrieval can be impossible from below. The call for this can be "TEST", then "OK", from the last person. To do this a person below gives a short haul on the pull-down rope and checks that it starts to pull down. The caver at the pitch head verifies that the rope was pulling down before descending themselves.

During the pull-down, the pull-down person should be well away from the ascending side of the rope to minimise the chance of the rope wrapping around itself. Another person should feed the rope out, checking for rope tangles and especially checking the end-rope knot has been untied before the end is out of reach.

If the trip involves multiple pitches a spare length of rope sufficient to get the party down the longest drop should be carried in case of a hang-up. Parties being extra cautious may carry more ropes.

### Appendix 3: Toxic (foul) air

The level of risk attached to this hazard may be acceptable or unacceptable.

The **signs and symptoms** of a short exposure to toxic air are:

- A rapid increase in heart and breathing rates,
- Headache,
- Clumsiness,
- Tiredness,
- Feeling unexpectedly very warm.
- Anxiety,
- Loss of energy,

The **signs and symptoms of a long exposure** to toxic air are:

- Increased heart and breathing rate,
- Lack of attention to details,
- Clumsiness and weakness,
- Tiredness,
- Severe anxiety,
- Panic,
- Severe headache,
- Nausea,
- Difficulty breathing,
- Unconsciousness due to asphyxiation,
- Death.

The flame-extinction test indicates presence of toxic air. Light a match or cigarette lighter in the suspected toxic air: if the flame goes out (or won't burn properly), foul air is present. However, the test is not conclusive; the flame might not go out at low concentrations of toxic air that still have adverse effects. Also note that a match head will burn in toxic air, but the wooden part will not.

Most people will start to show symptoms when the level of carbon dioxide in the atmosphere reaches 1%.

The flame test typically indicates a carbon dioxide level approaching 5%. This is approaching an ***extremely high (unacceptable) level of risk***.

Unless the party has an accurate way to measure the concentration of gases in the atmosphere, the flame test is the final warning that they will receive. Lethal concentrations of carbon dioxide may be present within metres of the first instance where the flame test is failed.

The best advice is that if the group reasonably suspects the presence of toxic air at risky levels (>5%) while in a cave (based on any knowledge, symptoms and/or tests performed), the party should leave the suspected area of toxic air promptly and without panic unless the party is equipped to safely traverse the area.

Carbon dioxide is heavier than air and will sink to the lower levels of a cave. If the party encounters dangerous levels of carbon dioxide, they may rapidly escape to fresh air by retreating up the slope they have descended. Toxic air found on pitches is particularly hazardous and extreme care is needed to ensure that caver does not get so far into bad air that s/he cannot return to safe air sufficiently quickly.