FLINDERS UNIVERSITY SPELEOLOGICAL SOCIETY

HANDBOOK

AUSTRALIAN SPELEOLOGICAL FEDERATION INC.

History

Although a great deal of cave exploration took place in the period 1880-1910, there are few records covering the following 40 years. The first organized cave exploration club, the Tasmanian Caverneering Club, was formed in 1946. However, within the next ten years there was sufficient support for the formation in December 1956, at Victor Harbor of the Australian Speleological Federation. The Federation was set up to collate information on caves and stimulate further exploration. Since that time it has encouraged caving for both pleasure and research and built a national and international social environment for Australian cavers.

Structure

ASF consists of a number of regionally based caving clubs each catering for local activities. The local clubs elect representatives onto the national Council. Meetings of the Federation's Council are held annually, with a Biennial National Conference alternating around the States. Club representation on the national Council is defined by the number of members each club has. Currently FUSSI has 1 representative on the national Council.

Aims

The major activities of the Federation are:

- The formulation of national policies relating to caving standards and ethics, cave safety, documentation procedures and survey standards.
- Preparation of a national automated data bank, cataloguing all Australian caves, including cave maps and primary reference sources.
- Sponsoring of biennial national speleological conferences and irregular Cave Management Conferences.
- An extensive publication programme in association with the above aims.
- The maintenance of a Library.
- Sponsoring of specialist consultancy services for preparation of karst and cave management plans.
- Sponsoring of Speleological projects.
- Active protection of the Cave and Karst Environment via its Environmental Fund.
- The Promotion of Cave Research.

Since the formation of the Federation, Australian speleology has been well organized and active on both a national and local level, with separate regular national publications of cave research, cave exploration, and cave management in addition to numerous club newsletters.

Research on caves and karst has been carried out primarily by qualified individuals with the active assistance of speleological societies. Major research programmes have been directed from the Australian National University, Canberra, and the Universities of Sydney, New South Wales and Tasmania and from the various state museums. There is sufficient original research to support a high-quality international referred journal, Helictite, Journal of Australasian Cave Research. Now in its 40th year, Helictite has a standard similar to the Transactions in BCRA, NSS Bulletin and Annales de Speleologie.

Membership
Membership is open to anyone who has a continuing interest in caving. You can join as a member of a club, as an individual member or family member or as a student. Membership will entitle you to receive the ASF's quarterly journal, Caves Australia and introduce you to the various commissions and activities of the ASF.

FUSSI was involved with the ASF on a brief occasion in 1983 as a co-coordinator, with the Cave Exploration Group of South Australia, (CEGSA), of the Biennial ASF, Speleo Vision Conference that was held at Flinders University. FUSSI became an Associate of the ASF in 1988 and a Corporate Member in 1990. Since then its members have held Vice President positions on the ASF National Executive, edited its national newsletter, *Australian Caver*, as well as been in involved in the drafting of cave management plans and the establishment of Leadership standards.

Your current ASF liasion Officers are: Bronya Alexander and Clare Buswell

FUSSI Members who held ASF Positions:

Clare Buswell.
ASF Vice President 92-94.
Editor of Australian Caver. 1991 -1994

Dr. K. Magraith.
ASF Vice President 92-94.

THE ASF, CONSERVING AUSTRALIA'S CAVES.

Web address: www.caves.org.au

ABOUT FUSSI

Flinders University Speleological Society Inc is an incorporated society based at Flinders University and is one of the oldest clubs on campus. Formed in 1974, the original purpose of FUSSI was to carry out scientific work on the Naracoorte Caves. Since then FUSSI members have visited many cave and karst areas undertaking speleological work on the Nullarbor and the Flinders Rangers. During the academic year there are weekend trips to places within South Australia: Mount Gambier, Yorke Peninsula, the Flinders Ranges and caves along the River Murray amongst others. During the university holidays, the club undertakes longer trips to the New South Wales, Western Australia, Victorian and Tasmanian karst regions.

Although Speleology is a serious business, FUSSI trips are always good fun as we have a tradition of doing things in style. Our caving trips are characterised by getting down and very dirty - visiting great caves, enjoying good food, good wine, port, chocolate and witty conversation.

Whether your interest is in seeing the stunning decorations present in many Australian caves, crawling around dark passages, abseiling, SRT, cave surveying, search and rescue, learning about cave formation, cave biota, cave conservation or travelling to places you might not otherwise get to see, it's worth joining our underground organization so that you can discover the many joys of speleology. Membership is open to students at Flinders and the wider public.

Flinders University Speleological Society Incorporated

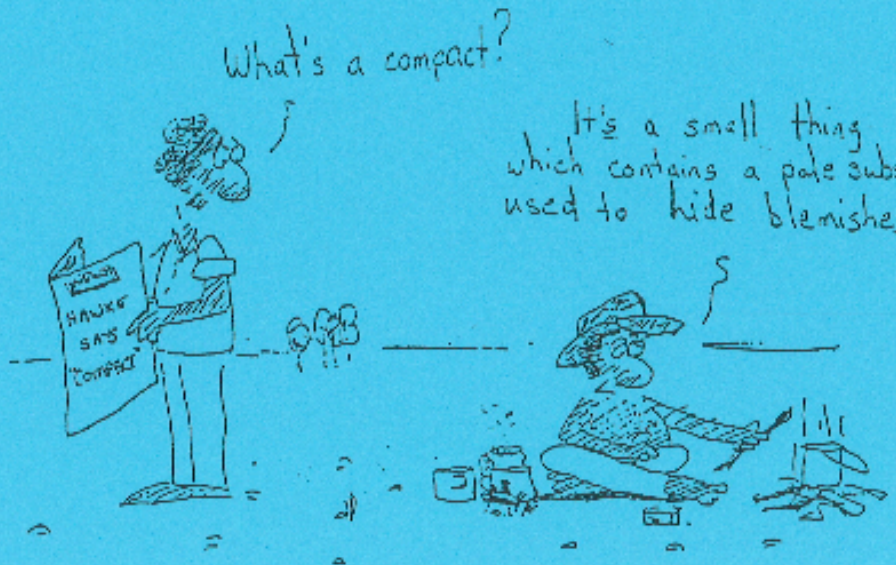
GET DOWN GET DIRTY

GO CAVING

www.fussi.org.au | Corporate Member of the Australian Speleological Federation

Flinders University Speleological Society

CONSTITUTION AND STANDING ORDERS



31.1.90

FUSSI CONSTITUTION

Statement of Acknowledgement

The members of Flinders University Speleological Society Incorporated would like to acknowledge the traditional custodians of this land and we will endeavor to show respect to the religious and spiritual beliefs of these peoples and their cultures.

FLINDERS UNIVERSITY SPELEOLOGICAL SOCIETY INC.

1 NAME:
- 1.1 There shall be a club called the Flinders University Speleological Society Inc., hereinafter referred to as the Society.
- 1.2 That the club be known as FUSSI.

2 OBJECTS:
- 2.1 The objects of the Society shall be:
  - 2.1.1 To foster interest among University Members and members of the wider public in all aspects of caving with particular interest in S.A. caves.
  - 2.1.2 To promote interest, exploration and preservation of these caves.
  - 2.1.3 To maintain records of all trips and record results of all trips and record results of all investigations.
  - 2.1.4 To foster scientific work in relation to caves and the karst environment.
  - 2.1.5 To co-ordinate with other clubs to further these aims.

3 MEMBERSHIP:
- 3.1 All members of the Flinders University and the general public shall be eligible for membership of the Society and shall become members of the Society upon payment of the Society membership fee.
- 3.2 Membership of the Society is open to any member of Flinders University and the general public. interested in speleology, who concurs with the aims of the Society.
- 3.3 That membership of the Society be divided into Full and Associate members.
- 3.4 Full Membership is open to those who, in addition to the basic requirements above:
  - 3.4.1 Have completed at least 30 hours of caving in non-tourist areas of caves, have been on four club trips in the previous year and have completed basic competencies in caving practice.
  - 3.4.2 Have a thorough knowledge of the Australian Speleological Federation's (ASF) Safety Regulations and Code of Ethics in particular and knowledge of its codes and guidelines.
  - 3.4.3 Show a sufficient degree of responsibility for themselves, others and the karst environment.

    Or have satisfied the above in respect of membership of any other ASF member society.
- 3.5 Associate membership is open to any member of the Flinders University or the general public who satisfies the basic requirements above, and does not wish to be a Full member.
- 3.6 The Society Membership Fee shall be payable by 31st March each year and is valid till 31st of December of that year and shall be determined by the Society.

4 COMMITTEE:
- 4.1 The affairs of the Society shall be managed by a Committee comprised of:
  - 4.1.1 President
  - 4.1.2 Honorary Secretary/Public Officer
  - 4.1.3 Honorary Treasurer

4.1.8 ASF Liaison Officer

4.2 The Committee shall meet at least once each month during the academic year.

4.3 The Committee shall have power to make any regulations necessary to put this Constitution into effect.

4.4 A member of the Committee shall cease to be a member of the same upon any of the following happening:

4.4.1 He/she submits, in writing, his/her resignation to the Honorary Secretary;

4.4.2 He/she is absent from three consecutive Committee meetings without leave being granted by the Committee;

4.4.3 He/she ceases to be a member of the Society.

4.5 The Committee shall have the power to fill any vacancy occurring on the Committee provided that such action is ratified by a General Meeting of the Society, to be held within one month of such action being taken.

4.6 The Committee shall have the power to appoint, from time to time, such officers and sub-committee as it deems necessary. The duties of such officers and sub-committees shall be defined by the Committee to which the said officers and sub-committees shall be responsible.

5 FINANCE:

5.1 A bank account in the name of the Society shall be kept at a Bank or Credit Union.

5.2 All funds of the Society shall be kept in the Society bank account and appropriated only with the approval of the Committee.

5.3 The Honorary Treasurer shall keep proper books of account or the Society and shall prepare such statements of the Society's financial affairs as the Committee directs.

5.4 The financial year of the Society shall be from 1st January to 31st of December.

5.5 The Honorary Treasurer shall prepare, at the close of each financial year, a statement of the Society's financial affairs which shall be duly audited.

6 ANNUAL GENERAL MEETING:

6.1 There shall be an Annual General Meeting of the Society to be held by the end of May each year to:

6.1.1 Receive a report from the Committee,

6.1.2 Receive the audited statements of the financial affairs of the Society for the previous financial year,

6.1.3 Elect the Committee, and

6.1.4 Consider such other business as is properly brought before the meeting.

6.2 The honorary Secretary shall give 14 days notice of the Annual General Meeting by means of a notice placed conspicuously on a noticeboard in the Flinders University Union Building.

7 GENERAL MEETINGS:

7.1 The Honorary Secretary shall convene a General Meeting of the Society:

7.1.1 At the direction of the Committee,

7.1.2 Within 14 days of receipt of a petition signed by one-third of the total membership, or ten members of the Society, whichever is the least; provided that such a petition shall state the business to be discussed at the General Meeting.

7.2 The Honorary Secretary shall give 7 days notice of a General Meeting by means of a notice placed conspicuously on a noticeboard in the Flinders University Union Building.

8 VOTING:

8.1 The Chairperson at each meeting of the Society shall be the President or in her/his absence a person eligible to vote and elected by the meeting.

8.2 Persons eligible to vote shall be:

8.2.1 At Committee Meetings, members of the Committee,

8.2.2 At General and Annual General Meetings, those members, both full and associate, of the Society present.

8.3 The Chairperson of each meeting of the Society shall have a deliberative vote only.

9.2 The quorum for a General or Annual General Meeting shall be one third of the total membership or ten members of the Society, whichever is the least; provided that, for a General Meeting called under clause 7.1.2 of this Constitution, the quorum shall include at least fifty percent (50%) of the petitioning members.

10 ALTERATIONS TO THIS CONSTITUTION

10.1 The procedure for altering this constitution shall be:

10.1.1 The proposed amendments shall be set out in full and posted conspicuously on a noticeboard in the Flinders University Union Building, at least fourteen days before the (Annual) General Meeting at which they are to be discussed.

10.1.2 The amendments shall be agreed to by at least two-thirds of the members of the Society present at the (Annual) General Meeting at which they are to be discussed.

11 DISBANDENMENT:

11.1 Should the Society be disbanded or in any way become defunct, then all physical assets of the Society shall be distributed to the Australian Speleological Federation's university member clubs and any funds shall be given to the ASF Environmental Fund.

March 2007

STANDING ORDERS

1

A) Should any member violate this Constitution or Standing Orders of the Society or for any cause be deemed an undesirable member, then they may be expelled, suspended requested to resign or cautioned by a 75% majority decision of committee members or the designated representatives present at a meeting of the Committee called for that purpose.

B) Any member so disciplined shall have the right of appeal to the next GM of the Society.

2

Cave Maps will only be given to trip leaders and then the maps are to be returned to the secretary by the trip leader immediately after the trip. (The reason for this stems from the importance of not having maps in wide circulation so as to prevent the possibility of caves being vandalised if maps go astray.)

3)

A new member of the club must attend a meeting of the club before they attend any trips.

4)

The trip leader has the right to refuse permission for any person on a trip to enter a cave.

5)

FUSSI gear only goes on FUSSI advertised trips.

6) A) An individual or caving group admitting responsibility for the loss or damage of FUSSI equipment should pay the cost of replacement or repair of the equipment. Price to be determined by the executive.

B) If no individual or caving group will take responsibility for the loss or damage of FUSSI equipment, then all individuals participating in the trip shall equally share the costs of replacement or repair of lost or damaged equipment.

Note: A caving group is considered to be a group of people who enter and exit a cave together and cave as a team whilst underground.

Flinders University Speleological Society

CODE OF ETHICS

31.1.90

Australian Speleological Federation (Inc)

"What we have now is all there will ever be - Conserve Australia's Caves"

P.O. BOX 388 BROADWAY 2007

CODE OF ETHICS AND CONSERVATION

Adopted 1992

1. Introduction

1.1 Recognising their primary aim of protecting the caves and karst of Australasia, cavers will actively promote cave conservation and sound management practices through example, education, advice and training.

1.2 This code establishes a minimum standard of caving practice.

1.3 Higher standards may be required by management authorities for particular caves or karst regions, in which case those standards will be adhered to.

2. Toward Landowners and Management Authorities

2.1 Landowners, tourist guides and any person representing a management authority will be treated with courtesy and respect.

2.2 All caving parties must have specific or tacit approval from the landowner and/or management authority before entering any property or reserve, must follow only agreed routes and must not visit forbidden areas.

2.3 The prevailing procedures regarding gates on properties and reserves will be followed, and care taken to cause no damage to stock, crops, equipment or landscape features. In short, leave as found.

2.4 All parties will be as self sufficient as possible and will not presume on the good will of landowners and/or management authorities for water, supplies or assistance.

2.5 Where the cave entrance has been blocked by the landowner and/or management authority, it will be re-blocked after use, or, with the landowner and/or management authority's permission more appropriate protection installed unless the landowner and/or management authority otherwise instructs.

2.6 No gate will be installed at or in a cave unless approved by the landowner and/or management authority and arrangements are made for key security. Any gate must have an accompanying sign giving reasons for gating and access conditions unless the landowner and/or management authority otherwise instructs.

2.7 No cave excavation, including the use of explosives, will be undertaken without the permission of the landowner and/or management authority and/or management authority and the society committee, and only after an assessment of the environmental effect.

3. Toward Caves

3.1 Camping will not occur in a cave, unless absolutely necessary to achieve a specific speleological or conservation objective.

3.2 Caving activity must be conducted in a manner responsible to the cave environment, taking particular care to avoid damage to speleothems, sediments, biota and other natural phenomena. The maximum size of any party should be limited to that which provides the best quality of experience or achieves specific aims.

3.3 Cave entrances and passages should not be excavated/enlarged, including the use of explosives, water levels in sumps should not be modified and stream flows should not be diverted, until all possible effects are assessed and the appropriate permission gained. Any modification must be the minimum required.

3.4 Established marked routes must be used, single tracks should be followed and care taken to avoid needless deposition of mud. Mud-throwing or modelling is unacceptable.

3.5 All human introduced wastes must be removed from the cave and disposed of properly.

3.6 Cavers will not smoke in any cave.

3.7 Caves must not be disfigured by unnecessary marking (including 'direction arrows'). Entrance tags and survey marks should be small and inconspicuous.

3.8 Disturbance should not be caused to any biotic community. No disturbance should be caused to maternity or over-wintering roosts of bats. Collection of specimens will be kept to the minimum required for study purposes only.

3.9 The technique, agent and justification for air or water flow-tracing experiments should be chosen to minimise environmental impact and must be approved by the relevant authorities and the society committee.

3.10 Explosives should not be used inside a cave or at the entrance unless absolutely necessary, and then only with the permission of the landowner and/or management authority and the society committee, and only after an assessment of the environmental impact.

4. General

4.1 Recognised codes for minimum impact camping will be observed with particular emphasis on complete removal of rubbish and, wherever possible, avoidance of camping on karst catchment areas.

4.2 Reports on speleological work and caving activities are to be honest and accurate, avoiding sensationalism or exaggeration.

4.3 Any published work must acknowledge other people's contributions to the work, either as clubs or individuals, published work or personal communication.

4.4 Consideration should be given before publishing an article disclosing a cave's location, as to its intended audience, the wishes of the landowner and/or management authority, and the subsequent effect on the cave.

4.5 When visiting an area frequented by another society, the club or party will co-operate fully with that society.

4.6 Disputes will be conducted in a restrained and responsible manner.

Flinders University Speleological Society

GEOLOGICAL NOTES

"Oo! Grog run into a a Dang! Now which kind stick up and which kind hang down?"

How Caves are Formed

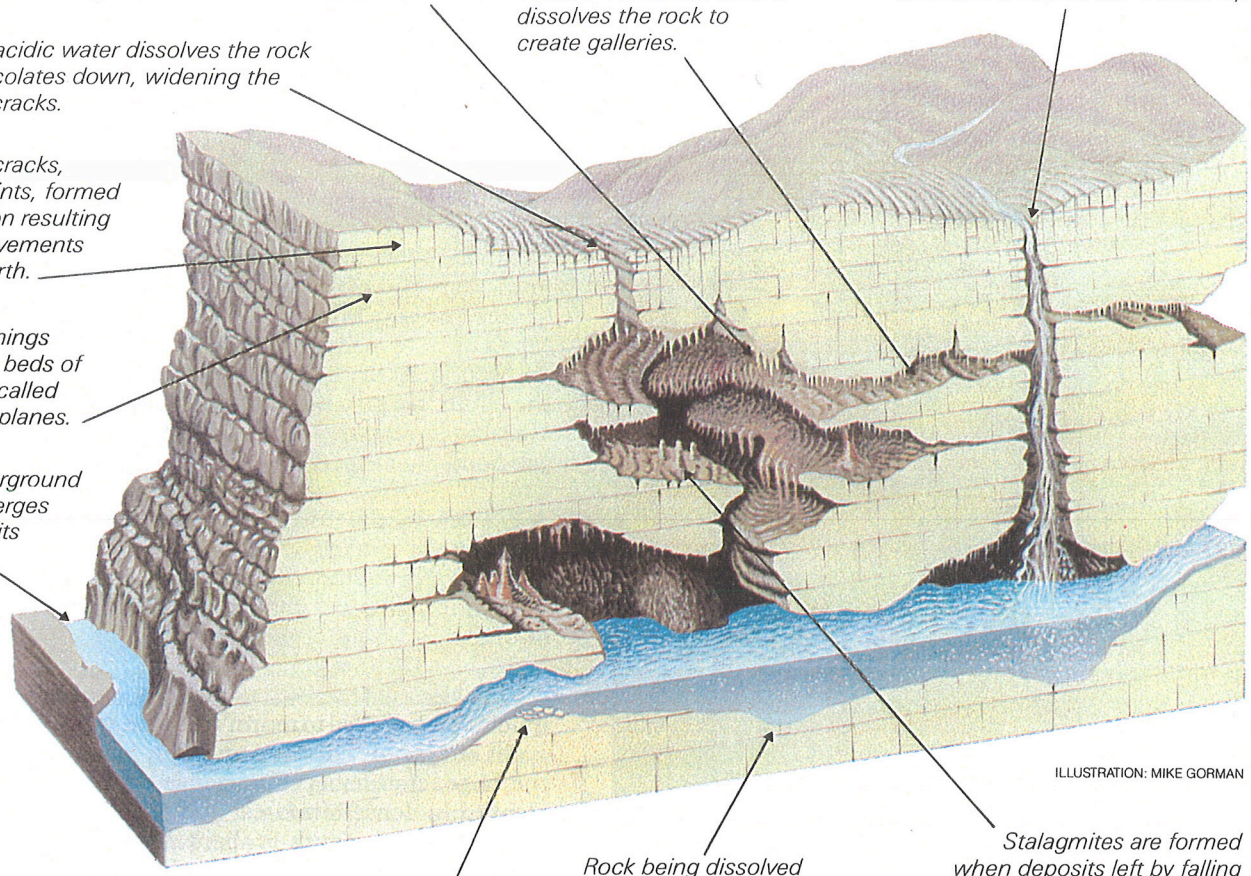


ILLUSTRATION: MIKE GORMAN

LARGE caves are most commonly found in limestone and were created by the action of water over time.

Limestone consists of calcite (calcium carbonate) and often contains the remains of ancient sea creatures. However, the Mt Anne caves are in 600-million-year-old dolomite, a rock made up of calcium magnesium carbonate. The clue to cave formation in both these rocks is that they dissolve in water, though dolomite does so more slowly.

The formation process begins when limestone is exposed at the Earth's surface. This might happen when relatively young limestone is raised above sea-level by movements in the Earth's crust or when older limestone and dolomite in mountain ranges are uncovered. In Australia, caves have formed in rock as old as 1000 million years and as young as a few thousand years. They are usually a lot younger than the rocks in which they have formed.

Falling rain absorbs carbon dioxide from the air and picks up more from plant roots, bacteria and other organisms as it percolates through the soil. This makes it slightly acidic and as it finds its way into openings in the rock it begins to widen them by dissolving the limestone.

Limestone forms in layers, called beds. There are two kinds of openings in this rock: bedding planes, which are gaps between beds; and joints, which are vertical splits in the beds caused by tension in the earth. Deep caves, like those at Mt Anne, are often formed in rock that has been tilted by movement of the earth.

Near the surface, openings contain both air and water, but lower down they are completely filled with water. Here a significant stage of the cave formation process takes place. Sluggish water dissolves the limestone to create large cavities while fast-moving water forms complex plumbing systems with rounded cross-sections.

When the water-level in these systems drops and air gets in, the water begins to behave as it does in streams on the surface, cutting out meandering courses and canyons in the cave floor. Large cavities, losing the support of the water that used to fill them, may collapse.

Stalactites and stalagmites form only in air. Both are known as dripstone because they consist of deposits left by water dripping from a cave roof. They are among the many features that attract people of all kinds to caves. But undoubtedly the biggest attraction of all is the perpetual lure of the unknown – because so many caves are still waiting to be discovered.

Armstrong Osborne

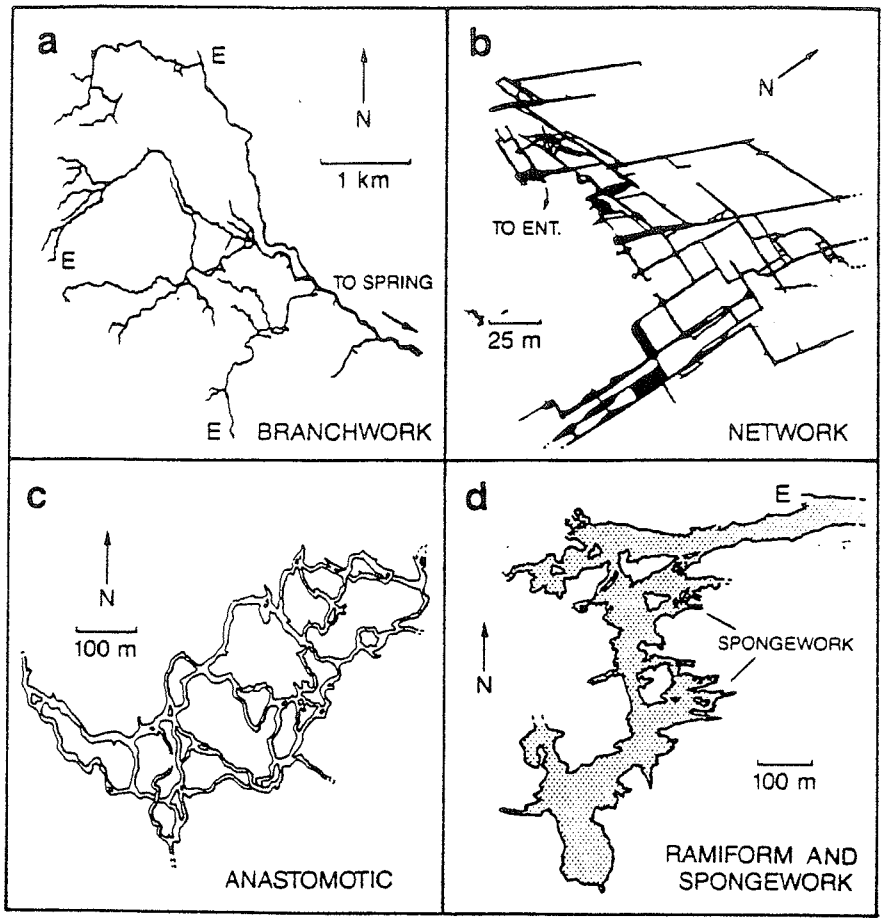


Figure 1. Common patterns of solutional caves: (a) branchwork: Crevice Cave, Missouri (Joachim Fm.); (b) network: part of Crossroads Cave, Virginia (New Scotland Fm.), (c) anastomotic: part of Hölloch, Switzerland (Cretaceous Schrattenkalk), (d) ramiform and spongework: Carlsbad Cavern, New Mexico (Capitan Fm.). E = entrance. Because of their small width-to-length ratio, passages in a and b are shown as solid lines. Maps reproduced with permission of (a) Paul Hauck, (b) H. H. Douglas, (c) Alfred Bögli, (d) Cave Research Foundation.

Branchwork caves consist of passages that join as tributaries (Figs. 1a and 2). They are by far the most common type, representing 57% of the caves observed for this study and 65% of the aggregate passage length. While forming, each first-order branch serves as a conduit for water fed by a rather discrete recharge source. Water converges into higher-order passages that become fewer and generally larger in the downstream direction. Closed loops are rare, except where water abandons its original route in favor of a new one and rejoins it, or a communicating passage, farther downstream. Branchwork caves are the subsurface hydrologic equivalent of dendritic river channels. In contrast, the following four are maze caves typified by many closed loops of synchronous origin.

Network caves are angular grids of intersecting fissures formed by the widening of nearly all major fractures within favorable areas of soluble rock (Figs. 1b and 3). They include 17% of the observed sample, both in number and in total length. Closed loops are common, and the straight, relatively high and narrow passages form a pattern like that of city streets. Some rudimentary networks consist of an angular array of dead-end fissures with few closed loops. Such fissures lack the individual recharge sources of branchwork caves.

Anastomotic caves consist of curvilinear tubes that intersect in a braided pattern with many closed loops (Figs. 1c and 4). They usually form a two-dimensional array along a single favorable parting or low-angle fracture. Rare three-dimensional variants follow more than one geologic structure. Fracture-controlled segments may be present but do not dominate the pattern. Anastomotic mazes are usually superposed on branchworks and rarely constitute entire caves. Only 3% of the observed caves are predominantly anastomotic, but anastomotic passages account for 10% of the total sample length.

Spongework caves consist of interconnected solution cavities of varied size in a seemingly random three-dimensional pattern like pores in a sponge (Figs. 1d and 5). They represent 5% of the observed sample but less than 1% of the aggregate length. Most appear to have formed by coalescing of intergranular pores and minor interstices.

Ramiform (or ramifying) caves in plan view resemble ink blots or Rorschach patterns. Irregular rooms and galleries wander three-dimensionally with branches extending out from the main areas of development (Fig. 1d). Passage interconnections are common, producing a continuous gradation with spongework and network caves. Abrupt variations in gradient and cross section are typical. Unlike those of a branchwork, ramiform passages are not convergent tributaries fed by different sources of surface recharge. Instead, many have served as sequential outlets for ground water. Ramiform caves constitute 4% of the observed sample and 8% of the aggregate length.

Single-passage caves are merely rudimentary forms of the types described above, although some reach large size. They include 14% of the observed caves but less than 1% of the aggregate length.

Passage Types

Many early theorists assumed that caves originate in the phreatic zone and are later invaded and enlarged by vadose water. The ve parts of most caves, however, are well adjusted to the present pattern of recharge from the land surface, and so it is clear that few are preconditioned by an independent phreatic stage. The upstream reaches of a typical cave passage form in the vadose zone at the same time the downstream parts form in the phreatic zone. The question posed by early workers (for example Davis, 1930; Swinnerton, 1932; Bretz, 1942) as to whether caves originate above, at, or below the water table is not pertinent.

The water table in a karst region is highly irregular and discontinuous because of great variations in the size and distribution of surface openings and in the amount of water they transmit. The water-table concept must be used with caution at the scale of individual cave

AEOLIAN. (1) *adj*. Pertaining to or caused by the wind; wind-borne. (1) *n*. Landforms generated by the wind, or **sediments** transported by the wind. Derived from Æolus, the Latin God of the wind.

AEOLIAN CALCARENITE. *n*. **Calcareous** fine sand size particles which have become air-borne due to wind and are deposited as dunes, later to undergo consolidation and **diagenesis** to form dune **limestone**. Also see **calcarenite** and **Syngenetic Karst**.

ARMCHAIR CAVER. *n*. Colloquial term for an experienced caver who is now incapable of caving or a person still able to, but has lost the urge to actually go caving. On the other hand they may spend much of their time writing or reading caving books and hours may be spent reminiscing over photographs from past trips.

AVEN. *n*. A shaft which rises from a passage, sometimes leading to a passage above, but not open to the surface.

BEDROCK. *n*. The solid mass of parent rock originally laid down - from which a cave or feature has been eroded by mechanical or chemical action. This term includes bedrock which has been transformed in crystalline structure due to heat (eg. **marble**) but does not include redeposited minerals (eg. **speleothems**).

BREAKDOWN. (1) *v*. A fall of **bedrock** from cave roof or wall under its own weight. (2) *n*. A pile of broken bedrock.

BREATHING, **(relating to cave)** *v*. Movement of air in and out of a cave due to changes in atmospheric pressure and/or temperature changes on the surface.

CALCITE. *n*. The most common **polymorph** of **calcium carbonate** ($CaCO_3$). The most common constituent of **stalactites, stalagmites, flowstone** etc. **Limestone, marble** and **chalk** consist largely of calcite.

often formed by a **rimstone dam**. *cf*. **rimstone pool, sump** and **lake**.

CAVE SYSTEM. *n*. The whole known extent of interconnected caves and cavities underground, including those too small to enter, which have been proven to be atmospherically or hydrologically connected.

CAVER. *n*. A person who goes caving. (American, `spelunker').(British, 'Potholer')
Syn. **speleologist.**

DOLOMITE. (1) *n*. A double **carbonate** mineral consisting of **calcium** and magnesium. $CaMg(CO_3)_2$.

(2) *n*. A rock consisting largely of dolomite. *cf*. **magnesite.**

DOME. *n*. A large hemispherical hollow in the roof of a cave formed by **breakdown**, often in mechanically weak rocks where bedding and/or joints play little, or no part in dominating the form.

DUCK-UNDER. (1) *n*. A constriction in a **passage** where water is at or close to the cave roof for a short distance, which requires a caver to become (more or less) fully

submersed for a brief period before continuing. (2) *v*. The act of going through a **duck-under**. Also see **trap**

EFFLUX. *n*. Point of outward drainage of water from a cave system or **karst** area. May or may not be large enough to allow passage of a **caver**. *cf*. **outflow cave** and **resurgence**.

FAULT. *n*. A fracture in a continuous body of rock where one side has displaced relative to the other. Movement has occurred along the **fault plane**.

FLOWSTONE. *n*. A deposit of calcite formed by a thin film or trickle of **calcium** bearing water, flowing over walls or floors. *cf*. **travertine** and **speleothem**.

GASTROPOD. *n*. One of a large class of aquatic and terrestrial molluscs including the snails, slugs, limpets and whelks etc., usually having a single piece spirally coiled shell (univalve) and a flattened muscular creeping organ which acts as a foot on which they move about. Sometimes spelt **gasteropod.**

GEOMORPHOLOGY. *n*. The scientific study of landforms and landscapes. The term usually applies to the origins and dynamic morphology (changing structure and form) of the earth's land surfaces, but it can also include the morphology of the seafloor The science has developed in two distinctive ways that must be integrated in order for the whole picture of landscapes to emerge.

GOUR. *n*. Synonymous with **rimstone dam.** Derived from the French, the term ‘gour’ is now widely used in Europe. It should not be confused with the same word used for surface erosion features in deserts. *cf*. **microgour.**

GUANO. *n*. A large accumulation of **bat** excrement which may also consist partly of decomposing animal skeletal material and small fragments of rock particles. To a lesser extent in caves it may consist of bird droppings.

HELICTITE. *n*. A **speleothem** which often resembles the form of a twisted or worm-like shape and having appeared to defy gravity during its growth process.

HISTOPLASMOSIS. *n*. A fungal disease which initially affects human lungs and may spread to other organs if untreated. The fungus - Histoplasma capulatum, is an organism which grows in soil having a high nitrogen content, generally associated with **guano** of birds and **bats**. Spore is breathed in with airborne dust stirred up by the movement of cavers. The disease usually appears as a mild cold before complete recovery. Occasionally severe infections occur and if left untreated can lead to death.

Other names for this disease include:- "Histo", "cave disease", "cave fever", "Darling's disease", "Ohio Valley disease, "Tingo Maria fever", "reticuloendotheliosis" and "reticuloendothelial cytomycosis".

INVERTEBRATE. *n*. An animal without a backbone or spinal column.

JOINT. *n*. A natural division or gently curving crack, which bisects a **bedding-plane**. Separating two parts of a once continuous rock without relative movement along the **bedding-plane.**

KARREN. *n*. The minor forms of **karst** due to solution of rock on the surface or

underground. eg. **rillenkarren**, **rundkarren** and **spitzkarren.**

KARST. *n*. An area of terrain containing features which are formed by natural waters dissolving rock. In most cases these areas contain **caves**. Derived from the geographical name of a part of Slovenia. See **solution**.

KARST FEATURE. *n*. Any feature formed by natural waters dissolving rock above or below ground. eg **cave** and **karren**.

LAVA. (1) *n.* Molten rock that issues from an active volcano or through a fissure in the earth's crust. (2) *n.* Rock formed by the solidification of this substance. Lava surface types include '**pahoehoe**' and '**aa**'.

LAVA CAVE. *n.* A cave formed in **lava**, usually as a result of a flow of liquid lava through a solidification mass, or by roofing over of an open channel. Small lava caves may form as gas blisters.

LIMESTONE. *n.* A sedimentary rock composed mainly of **calcium carbonate** ($CaCO_3$). (Containing more than 50% $CaCO_3$). It usually originates from the accumulation of **calcareous** remains of marine life.

MARBLE. *n*. **Limestone** which has been re-crystallised after being subjected to high temperatures as may occur in nature from surrounding volcanic action. The resulting marble is much harder than limestone and is able to be polished, making it much sought after for sculptures and architecture. Also see **metamorphism**.

MOONMILK. *n.* A term used to describe, finely crystalline substances of varying compositions. Texture, not composition is implied by the term "moonmilk". Most commonly composed of calcite which forms a soft white powder when dry and feels like cream cheese or cotton candy when moist.

OOLITE. *n* A morphological term meaning a small spherical or subspherical, accretionary body consisting of two or more concentric rings. The overall size being smaller than 2 mm in diameter. Anything larger is called a **Pisolite**. The body can be made of any material and not necessarily calcite. A rock may be said to possess an oolitic texture if it consists largely of oolites. *(Pettijohn, F. J., 1975)*. In general the term **oolite** should <u>not</u> be used to describe a **cave pearl**.

PAHOEHOE. *n.* A type of **lava** in which the surface was relatively fluid just prior to complete solidifying and so formed smooth or porridge-like surfaces. Variants include wrinkled or 'ropy' surfaces, like thick flowing tar or pitch, and surfaces with small rounded knobs. Surface texture grades from 'pahoehoe' to '**aa**' lava.

PERCOLATION WATER. *n*. Water which is moving downward through pores, cracks and tight fissures in the **vadose zone**. *Syn*. **seepage water**.

PHREATIC DEVELOPMENT. *n*. Enlargement of existing joints and bedding planes by movement of water under pressure (ie with no free airspace).

PHREATIC ZONE. *n*. The level in the strata which is below the **watertable** and all cavities in the rock are filled with water.

POROSITY. *n*. (1) The property of rock or soil with small voids which may or may

not be **permeable.** (2) porosity due to fractures and joints in rock. (3) porosity of a **karst** system due to conduits. *cf*. **permeability** and **percolation water.**

QUATERNARY. *adv*. Of or pertaining to the youngest geological period covering approximately 1.8 million years to the present. - *n*. The quaternary period.

RESURGENCE. *n*. The point at which a stream resurfaces like a large **spring**. This occurs when water of a surface stream disappearing into a **stream sink**, where upon it flows underground for some distance. The resurfacing point of this stream is the **resurgence**. The underground water stream may also originate from a combination of many small surface streams and seepage in a cave system, before resurfacing at the **resurgence**. *cf*. **spring.**

RILLENKARREN. *n*. Well developed **solution flutes**. Small linear hollows separated by narrow, sharp ribs, which run down the steepest line of slope on steeply inclined to vertical faces. Usually formed on the surface of karst bedrock exposed to the atmosphere. *cf*. **rundkarren, spitzkarren.** *Syn*. **solution flute.**

RIMSTONE. *n*. A deposit precipitated from water flowing over the rim of a pool. *cf*. **speleothem**.

ROOF-SNIFFING. (1) *v*. Colloquial term for the act of edging oneself along a small water-filled passage, on your back with only sufficient airspace for eyes and nose. Also roof-sniff. (2) *n*. A place where a caver must roof-sniff.

SEDIMENTARY ROCK. *n*. Rock formed from accumulation of sediment, which may consist of rock fragments of various sizes, remains or products of animal or plants, production of chemical action or of evaporation, or mixture of these. Stratification is the single most characteristic feature of sedimentary rocks.

SPELEOLOGY. *n*. The exploration, mapping, photography, description and scientific study of caves, subterranean environments and phenomena relating to karst terrains. Includes:- **hydrology, geology, mineralogy, palaeontology** etc. The term is often extended to include **ground-trogging.***adj*. speleological.

SPELEAN. *adj*. pertaining to or inhabiting caves. From the L *spēlaeum*. from GK, *spélaion*

STROMATOLITE. *n*. A mound like structure of **calcareous sediments**, formed by fine layers of inorganic debris (eg sand grains) deposited on successive gum like mats produced by Cyanobacteria (formally known as Blue-Green Algae). Stromatolite fossils date back to the Archaean and Proterozoic eras, and their presence suggest the process of photosynthesis began at an early age in the development of life on earth. Excellent examples can be found in the **limestone** deposits of Brachina Gorge - Flinders Ranges South Australia. Also see **stromatolitic stalagmite**.

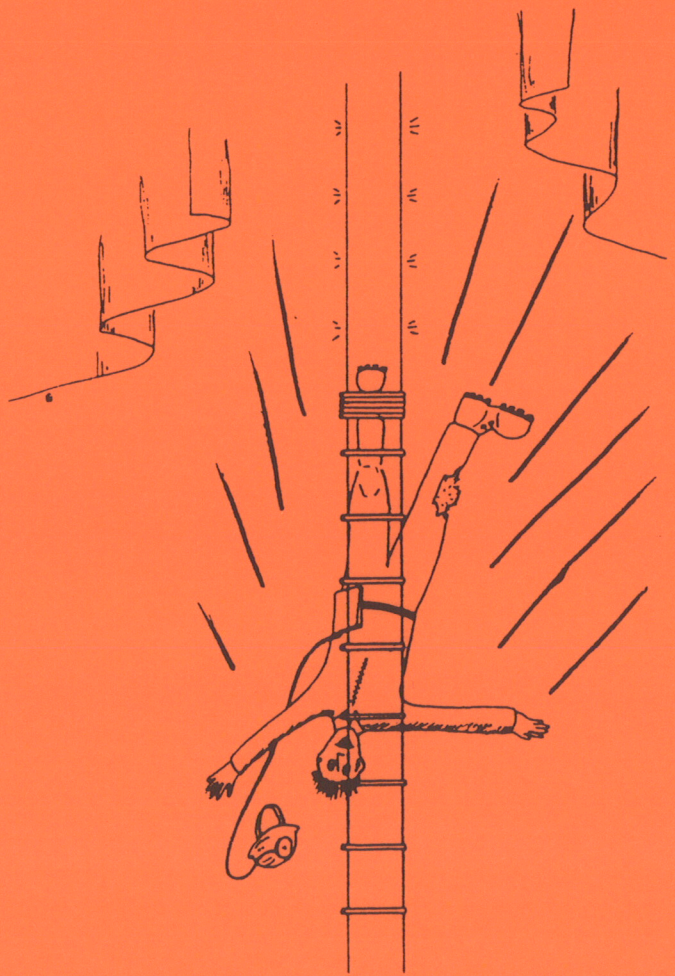
TUFA. *n*. A porous, light yellow crystalline limestone often with a spongy like appearance, deposited in solution from **spring** or surface water**. Calcium carbonate** which is deposited over twigs, dead leaves, moss and earth, builds up mounds or **terraces** in the above ground streams. Over time the vegetation decays, leaving the calcium carbonate with a spongy appearance.

VADOSE DEVELOPMENT. *n*. The down-cutting action of a cave stream having a

free airspace. Cave development due to water (vadose water) which descends freely and is not under hydrostatic pressure. The fast moving water carries rocks and grit which also cause mechanical erosion of the **bedrock**. A tell-tail sign of 'vadose development' is **scallop** markings in the bedrock, caused by running water.

Flinders University Speleological Society

SAFETY GUIDELINES



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CAVE SAFETY GUIDELINES

IMPORTANT CAUTIONS

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

Liability of ASF Inc., 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 THESE 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.

CAVE SAFETY GUIDELINES

INTRODUCTION

As cavers we enter into 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 on injured. Emergency medical support that is readily available to participants in other recreational 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 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 following 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 eg. 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 the each member of the party has the knowledge, abilities, skill and equipment to safely attempt the trip.

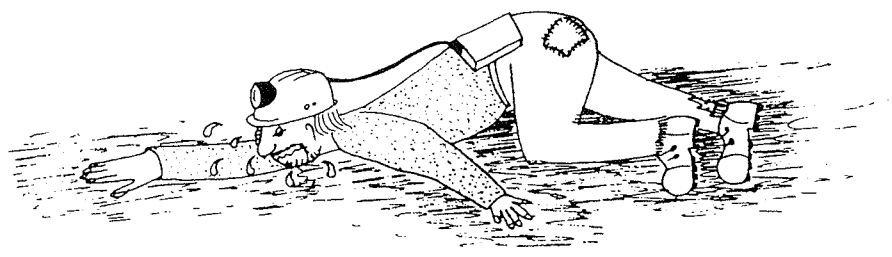
3.2 Conduct the trip in such a way that the party remains as an interconnected group and the leader is aware of each member's position and condition.

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 'Techniques')

... the leader should be on the look-out for signs of fatigue or distress ...



4. TEAM MEMBERS 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 taken, 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 Know how to use all the safety/vertical equipment needed for the trip.

4.4 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.)

4.5 Ensure that you are properly equipped for the trip.

4.6 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.

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

5. EQUIPMENT TO BE CARRIED UNDERGROUND

5.1 Mandatory personal equipment

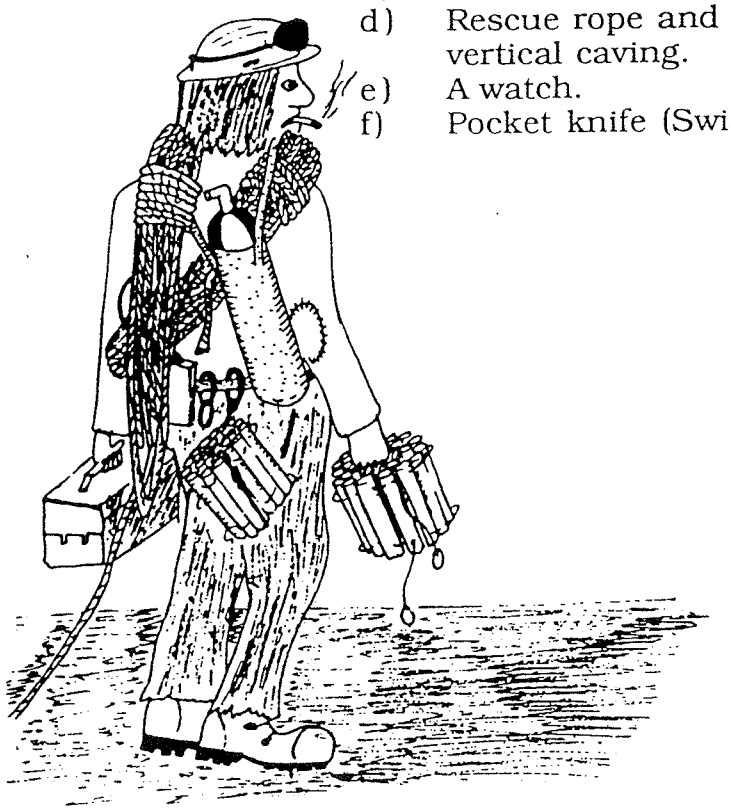
a) Helmet with rigid chin strap (ie not elastic)
b) Reliable and independent primary and secondary light sources, which should be carried on the person at all times.
c) Adequate clothing for cave attempted.
d) Adequate footwear - boots are recommended.
e) Waist tape (5m x 50mm webbing is recommended).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

5.2 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

5.3 Mandatory party equipment (should be carried by Leader):

a) First Aid Kit - leave at entrance or in 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!)



6. ABOVE GROUND ORGANISATION

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

a) 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)

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

7. TECHNIQUES

7.1 Climbing

use a lifeline on all pitches.

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

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

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

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

7.1.4 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 under:

"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 quite 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

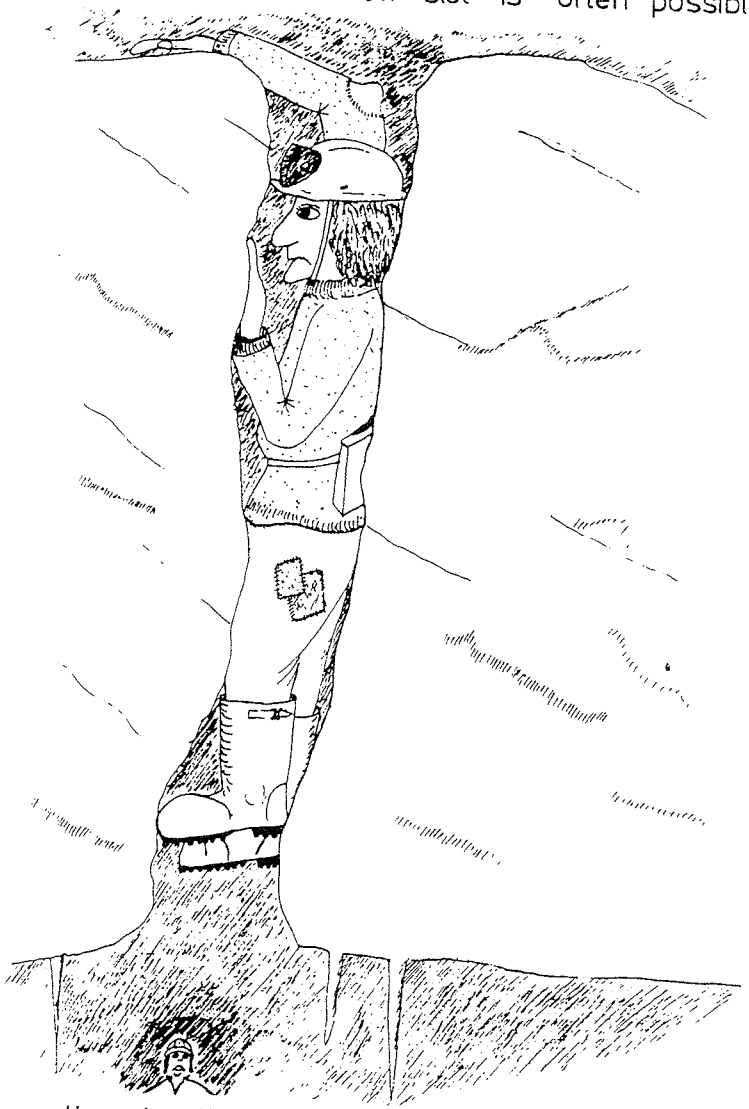
N.B. The word "slack" should NOT BE USED in calls, as it is ambiguous, and could mean either "up" or "down". Similarly for the word "rope", which is also ambiguous.

7.1.5 Whistle signals should be used on pitches where voices cannot be heard (eg. 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!	

Amongst the methods of free-climbing pitches, chimneying down a narrow slot is often possible,



though there may be disadvantages.

8. SINGLE ROPE TECHNIQUES

8.1 Minimum skills required

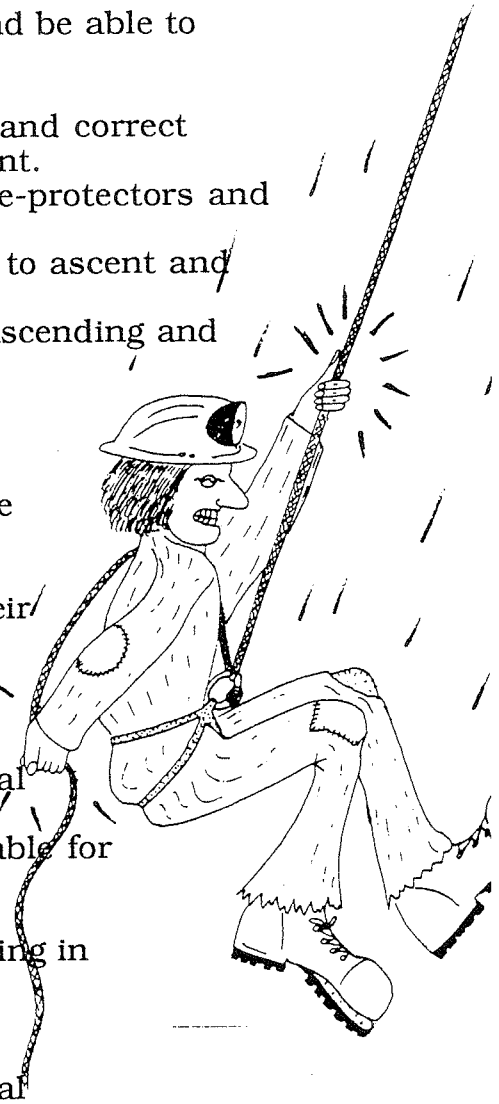
8.1.1 Any person engaging in vertical caving must be able to tie the following knots:

a) Tape knot
b) Figure Eight
c) Double Fishermans
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 re-belays, 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 krab/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.

9.0 CAVING IN FOUL AIR

9.1 General Comments

Brief exposure to foul air will cause a rapid increase in the rate of breathing.

Prolonged exposure may have the following effects on party members:

a) Lack of attention to details
b) Clumsiness
c) Fatigue
d) Anxiety
e) Severe headaches and in some cases, nausea

The flame extinction test is the best simple indication of danger. a table of the relative percentages at which CO2 will cause flame extinction follows:

Match	extinguishes at 1% CO2
Candle	extinguishes at 4% CO2
Carbide lamp	extinguishes at 6% CO2

9.2 As soon as foul air is suspected, a test should be made by striking a match. If the match will not strike or burns only briefly, the party should begin to exit immediately, 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 Beginners or others suffering fatigue and/or anxiety should be guided, watched and encouraged until out of the cave.

9.5 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.

9.6 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 CO_2 1-4%

a) A CO_2 tester should be carried - if nothing else available use a candle. If the CO_2 rises above 4% (ie the candle 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 CO_2 4-6%

Only experienced foul air cavers should enter these regions. In addition to the recommendations in 9.3.1 -

a) A CO_2 tester must be carried eg. a Draeger Gas Analyser

b) 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 CO_2 6% and above

Breathing apparatus (such as SCUBA) is necessary and all the precautions against equipment failure taken in mines rescue and cave diving should be followed.

10.0 CAVE DIVING

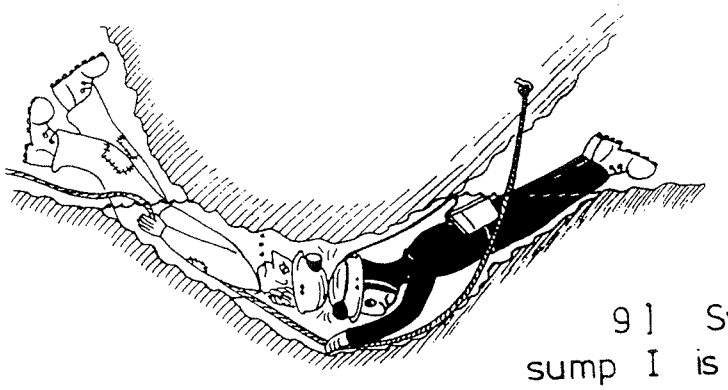
Cave Diving is defined as the diving of waterfilled passages/ caverns using SCUBA or other supplied breathing apparatus, and guide lines. All persons attempting cave diving should be properly trained and certified by a body such as the Cave Divers Association of Australia (CDAA).

Safety Guidelines for cave diving are contained in "ASF Cave Diving - Code of Practice".

11.0 FREE DIVING

Free Diving is defined as breath-held diving of (relatively) short waterfilled 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 (proposed) "ASF Free Diving - Code of Practice".



9] Swildon's sump 1 is a safe free-dive . . .

CAVE SAFETY GUIDELINES

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FIRST RESPONSE FOR CAVING ACCIDENTS

Introduction

Someone in your caving team has just had an accident. What are you going to do? I am sure that this thought has occurred to you, as it certainly has to me, so I have put together this article to outline some of the more important aspects of First Response to caving accidents.

First Response is the set of actions that your caving team should follow from when the accident occurs to when the rescue team arrives and takes over. The rescue team might be fellow cavers or an official rescue team such as the Police or State Emergency Services. There are five main stages to First response.

1. First Aid: DRABC
2. Record Important Information
3. Assess the Situation
4. Stabilisation
5. Evacuation

First Response begins with the DRABC action plan of the St. John Ambulance Association. I assume that you have a First Aid certificate. First Aid knowledge means that you will be able to look after your fellow caver as best you can in the event of an accident. In case you don't, I will cover the DRABC briefly then the other four stages of First Response in more detail.

Please note that the First Response guidelines outlined here are designed to assist you in remembering what to do. They will not cover what to do in every caving accident. It is up to you to stop and think, calmly and rationally. This will install confidence in your fellow cavers and is one of the characteristics of a good Trip Leader.

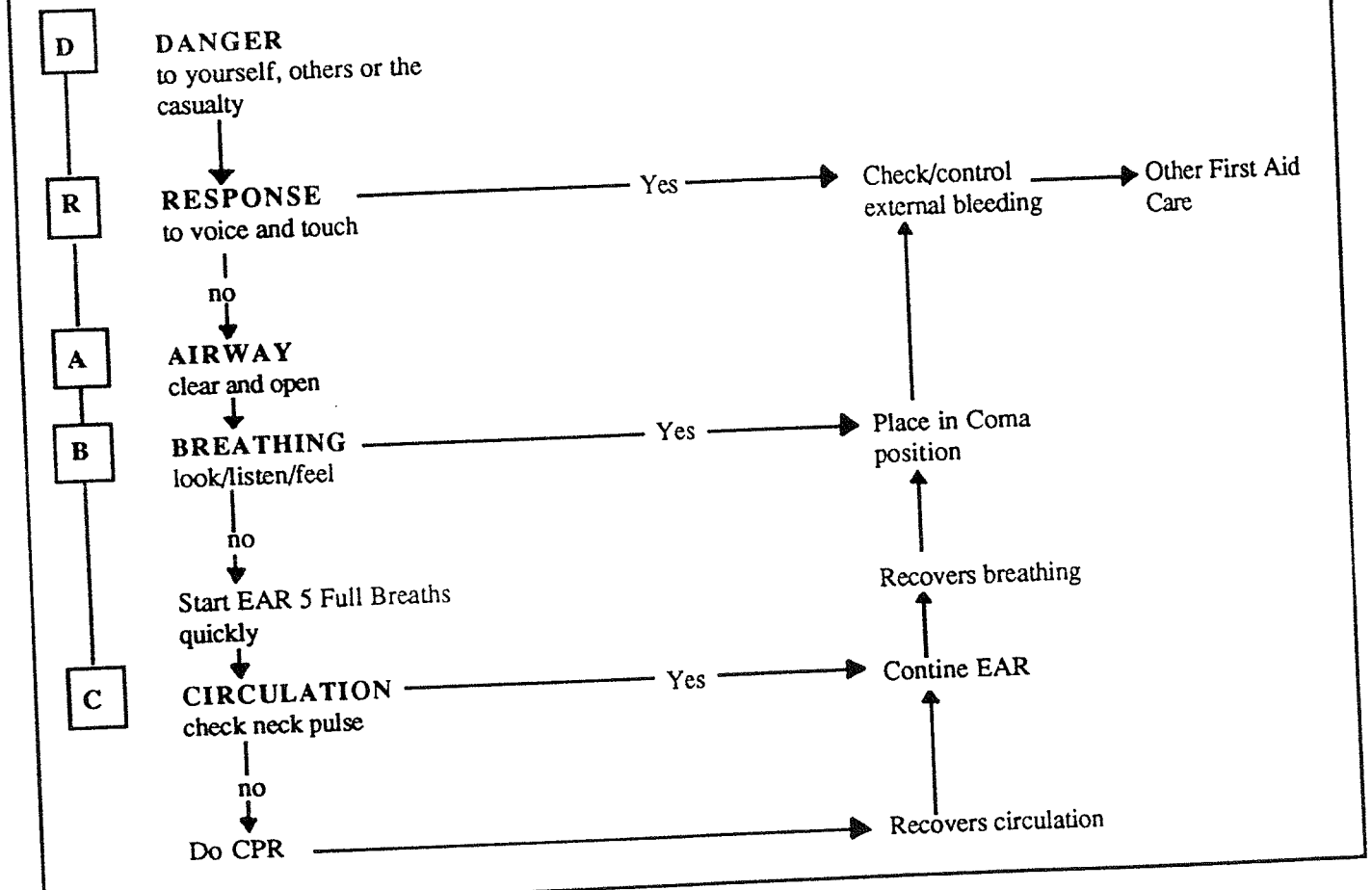
1. FIRST RESPONSE GUIDELINES

Danger: Check for danger to yourself, others or the casualty. Danger to yourself or others might arise from a rockpile collapse, flooding, or foul air. Your immediate concern should be to ensure that you or others are not the next casualty. Then ensure that the casualty is not in any further danger. This may mean removing the danger (eg removing loose rocks) or if necessary moving the casualty from the danger (eg suspension from a rope). If you move the casualty beware of possible spinal injuries!

Response: Check for a response from the casualty. Gently shake and shout. If the casualty responds then check and control serious external bleeding. If there is no response, proceed with ABC.

Airway: Open the mouth and clear if needed. Clear and open the airway.

DRABC: THE FIRST AID ACTION PLAN



FIRST RESPONSE FOR CAVING ACCIDENTS

Breathing: Look for the lower chest or abdomen rising and falling. Can you hear breathing sounds? Can you feel breathing? If the casualty is breathing but not responding, place into the coma position. If the casualty is not breathing start expired air resuscitation (EAR).

Circulation: If present, continue EAR. If absent, start cardio-pulmonary resuscitation (CPR).

As you can see there is a lot to learn in First Aid and I am not an instructor. It's best to go and do a short First Aid course. Let's now move on to the second stage in First Response.

2. RECORD IMPORTANT INFORMATION

Time of Accident:

Location of Accident:
Caving area
Cave name/Entrance number
Location of casualty (good description is required)
How long will it take to reach the casualty?
Is any equipment required to reach the casualty?

How did the accident occur?

Casualty Details:
- Name
- Age
- Sex
- Notify

What Injuries are there?

Caving Team Details:
- Name of team
- Number in team
- General experience

The above information must be written down. Experienced cavers should have paper and pencil on them (it also comes in handy for doing a grade 0 map of that newly discovered passage).

The time that an accident occurred is important because Ambulance personnel will be able to judge the probable condition of a casualty from the injuries described and the time elapsed since the accident.

The EXACT location of an accident is required. Often caves have multiple entrances so you need to specify what entrance should be used. The time it takes to reach the casualty and any equipment required will be important information to tell the rescuers.

How an accident occurred can provide an indication of other possible injuries to be aware of. For instance a broken ankle due to a fall down a small pitch would alert medical personnel to look for compressive fractures in the spine whereas the same injuries due to slipping would be unlikely to result in spinal injuries.

Casualty and caving team details are important for the medical personnel and rescue teams who will then be able to plan ahead. Of course you may wish to include more information than what I have indicated.

3. ASSESS THE SITUATION

Assessing the Situation is one of the most important judgements that you will have to make. Some of the questions to consider are: Will the casualty be able to assist themselves once they have been treated? Will you be able to do a self rescue or will outside assistance be required? Will the casualty exit the cave the same way they came in or is there an easier way out? Are there tight or wet passages, vertical sections or difficult traverses?

Often a casualty will be able to assist themselves, especially if they are an experienced caver. In this case a self rescue may be possible. However, if you decide that self rescue is possible and subsequently find that the casualty's condition deteriorates, or that the rescue is more difficult than anticipated and outside assistance is required, then crucial hours will have been lost. Remember that outside assistance may take many hours to arrive, so if you think you may need help, call for it early.

As a general rule if the casualty requires assistance to move and is:
(a) trapped, or
(b) in a tight cave, or
(c) more than 30 minutes from the surface,
then outside assistance will probably be required.

At the end of the situation assessment you will probably have come to a decision on what you are going to do. If you are going to do a self rescue because of the minor nature of the injuries then you will need to ensure that the casualty is stabilised, then commence the evacuation. If you decide that outside assistance is required because of the casualty's injuries or the difficulty of the cave then your role will be to stabilise the casualty until that assistance arrives.

4. STABILISATION

Stabilisation is concerned with ensuring that the casualty's medical condition does not deteriorate. There are two situations. Stabilisation of minor injuries before a self rescue and stabilisation of more extensive injuries while awaiting outside assistance. The latter is more difficult because of the longer time that will be involved and because the casualty's injuries might be more severe.

Stabilisation prior to self rescue:

FIRST RESPONSE FOR CAVING ACCIDENTS

Before you attempt to evacuate the casualty from the cave you must ensure that the casualty's medical condition is stable enough. For a self rescue it is unlikely that the casualty had any airway, breathing or circulation problems so all you would need to do would be minor First Aid. For instance, if the casualty had a cut you would bandage it to reduce bleeding and provide protection to the injury on the way out. When the casualty is stable proceed to the evacuation stage.

Stabilisation while awaiting outside assistance:

Stabilisation in this situation is more difficult and will extend for a few to several hours. There are four basic things that you will need to do.

(a) Arrange for a First Aid person and one other to remain with the casualty.

(b) Accompany or send the remaining persons out of the cave with clear written instructions on what to do.

(c) Contact the appropriate authority and inform them of the accident, passing on the information recorded earlier.

(d) Arrange for the transport in of equipment to stabilise the casualty.

(e) Arrange for someone to remain on the surface to lead medical personnel and rescuers in to the accident site.

Choose someone in the caving team that has a First Aid certificate or First Aid knowledge to remain with the casualty together with one other if possible. Then you can exit the cave to arrange the rescue. Alternatively, if you need to remain with the casualty then make sure that you give clear written instructions on how to arrange for help with the persons you send out of the cave. The First Aider should check and record the casualty's pulse, breathing and general condition every 15 minutes.

The other persons in your caving team don't need to be in the cave. It is better to send them out to obtain a decent meal as they might be needed during the rescue. Although it may not always be possible, try not to send people out alone. They will be as anxious as you are about the condition of the casualty and will probably try to exit the cave as fast as possible. This is just asking for another accident to occur at the worst possible time!

Make sure that the person you send out knows WHO to contact and HOW to contact them. In some areas this may be the Ranger, the local landowner or the Police.

There is considerable equipment to be brought into the cave to aid in the stabilisation of the casualty, support those remaining with the casualty and assist the rescuers. Some of the things that you would carry into the cave would be:

Sleeping bag
Closed cell foam mat or Therm-a-rest
Space blanket
Extra First Aid equipment
Notebook and pencil
Spare lights or batteries
Food, water and warm clothing for others
Track marking material

Injured or immobile persons easily succumb to hypothermia. Reduce this risk by placing the casualty in a sleeping bag with an an insulating layer underneath. A space blanket around the sleeping bag might also be useful. While this equipment is being procured the First Aider must attempt to keep the casualty warm with any spare clothing or their own body heat.

Extra First Aid equipment might be brought in as well as more notepaper for recording the casualty's medical condition regularly. This will be valuable for the medical personnel when they arrive as they can then consult your notes and see if the casualty's condition is stable or not.

You might also need spare lights or batteries and some food, drink and warm clothing for persons staying with the casualty. If you have some trackmarking material (brightly coloured tape, rope or reflective tags) then this could be used to delineate the way in for the rescuers.

It is important that when medical personnel and rescuers arrive that they know how to reach the accident site. Remember that they are probably unfamiliar with the cave and are probably not cavers. A person who knows the cave well can lead them directly to the casualty.

5. EVACUATION

Evacuation of the casualty from the cave will be done either by yourselves in the case of a self rescue, or it will be done by a professional rescue team if you have called for outside assistance.

Self rescue is usually done by whatever persons are with the casualty at the time. However, if you have enough personnel you might send some out to bring in some more vertical gear or First Aid equipment. If there is a local Ranger close by it is a good idea to inform him or her that your group has had an minor accident that you are handling it yourselves, and you will keep them informed.

Remember to regularly monitor the casualty's condition and occasionally re-assess the situation. Providing encouragement and presenting a positive attitude toward the casualty is very important.
Rescue by an official rescue squad will be a considerably

FIRST RESPONSE FOR CAVING ACCIDENTS

larger affair and falls outside the realm of First Response by cavers so I shall not cover it here.

Conclusion

Let's now summarise the stages of First response to caving accidents:

1. First Aid: DRABC
2. Record Important Information
3. Assess the Situation
4. Stabilisation
5. Evacuation

Now that I have laid out all these guidelines one by one in a sequential order I am now going to tell you to THINK CONCURRENTLY. At the same time that a First Aider is doing DRABC, delegate someone to record the important information while you assess the situation. While your group is organising equipment to take underground, contact the local authority and inform them of the situation.

Hopefully your group will never have a serious caving accident, but if it does occur your First Response actions will ensure that the casualty receives the optimum treatment and care during their journey to the surface.

Yours in Caving,
Mike Lake,
Convenor
ASF Safety
Commission

CAVE ACCIDENT/INCIDENT REPORT FORM

Your Name (optional): _____
Your A.S.F. Affiliation: _____
Today's Date: _____ Date of Incident: _____
Address (optional): _____
_____
Phone (optional): Home ( ) _____ Work ( ) _____

Please tick as many boxes as required for the following questions:

Source of Information:

I am the: Victim ☐
Witness ☐
Rescuer ☐
Uninvolved ☐

Contributing Factors:

Gear Failure ☐
Unsafe practice ☐
Bad luck ☐
Inexperience ☐

Injuries Sustained:

None ☐
Minor ☐
First aid required ☐

Hospitalisation req. ☐
Very serious ☐
Fatal ☐

Number of people injured _____
If known please supply a brief description of injuries.
Use the back of this form if necessary.

_____
_____

If rescue was required how was it undertaken:

Self rescue ☐ Assistance required (unofficial) ☐
Assistance required (Cave Guide etc.) ☐
Assistance required (Police/Official Rescue Group) ☐

Cave Description:

Name and number (if known) or physical location (if known)

_____
_____

Wet (deep standing pools or running stream) ☐
Dry (no water or slight seepage and shallow pools only) ☐
Horizontal: Under 200m long ☐ Over 200m long ☐
Vertical: Pitches less than 30m ☐ Pitches more than 30m ☐

Party Description:

Size of group: 1 - 4 ☐ 4 - 10 ☐ 11 plus ☐
ASF affiliated group ☐ Non-ASF affiliated* ☐

* Please supply details if known here:

_____
Has the incident been written up in a journal/circular/letter etc ?
If so please supply references here:

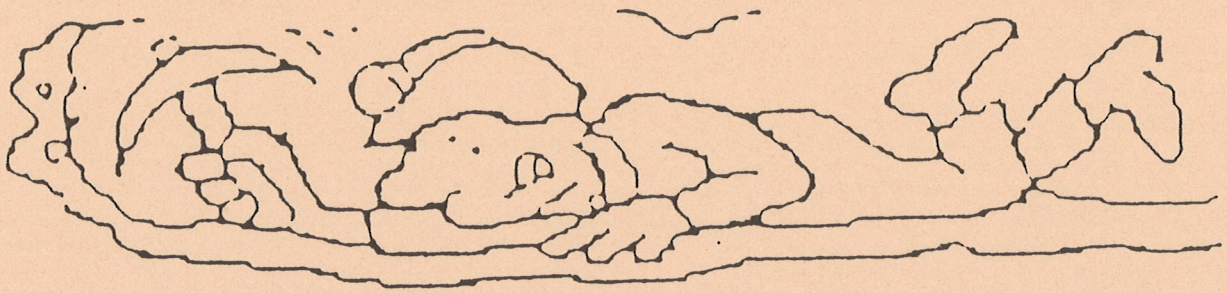
_____
Please supply any further details that you consider relevant overleaf (attach extra sheets if necessary). Also if available please enclose with the form copies of referenced articles.

When this form is completed please send to:
A.S.F. INC., P.O. BOX 388, BROADWAY, NSW 2007

Thank you for your assistance and cooperation.

Flinders University Speleological Society

TRAINING NOTES



31.1.90

Ropes

THE FIRST TIME I did a real climb — that is, one with a climbing partner other than a paid guide who shepherds a class of twelve through basic knots and a top-roped climb at the end of the day — I tagged along with Pete Thompson. Pete's a great guy, real good-sized, with a set jaw and straightforward ways. We got along famously.

It was a classic early morning Yosemite start, about eleven A.M. We met over at the park's rescue cache, a five-room former jail housing even the most greedy climber's dream — an almost unlimited amount of first-class climbing equipment hanging on the walls, just about begging to be borrowed. As we were racking up all the hardware we'd temporarily liberated, I noticed that Pete did not take down one of the cache ropes. This seemed a bit odd to me, as I had already casually examined by the touch method the braiding pattern of at least half of the numerous ropes on display there, fingered the radio sets and oxygen units a bit, and tried the gate action on a baker's dozen shiny, anodized orange carabiners.

After the mandatory desperate bushwhack a good ten minutes to the foot of the climb, we stopped to sort gear and rope up by some tall, sharp-edged flakes. This appeared to be the route. At one point in the proceedings, while I anxiously copied whatever he did, Pete noticed that I was standing on what would eventually be his end of the rope.

"Ah, Tim, could you please get off of my rope," was the polite request.

"Oh, sorry, no problem," I replied, and remembered that he had insisted on carrying it, and uncoiling it once at the cliff.

As Pete began to lead the first pitch, from up about three meters or so he glanced down at his belayer trying hard to perform his critical role, and once again standing on the rope. "Get off the rope."

"Oh, sorry!"

Pete finished the pitch, and pulled up slack rope in order to put me on belay. I was nervously contemplating my first few moves when the rope pulled tight under my foot, nearly knocking me off balance. "Get OFF the rope!!" A small projectile went flying just past me, striking the ground authoritatively not a meter away. Just from whence and how it came to pass wasn't clear.

"Yeah, well, ah, sorry."

After reaching the end of the pitch, with some difficulty, I scrambled onto the compact belay ledge. I was tired and it was hot at midday, so I didn't notice where my feet were until, "God DAMN IT — Get OFF the rope!" was yelled directly into my ear, the way the Keystone Kops in silent films used to yell into the throat of those old crank telephones that were screwed onto the wall.

At this point, Pete took some time to point out with great vigor and with some rather dramatic and explicit gestures the reasons for not standing, jumping, sitting, walking, dancing, cramponing, or performing any other activity on the rope that might compromise its strength and decrease the rope's life. Not only did our lives while climbing often depend on the rope, but my life in particular *directly* depended on my not standing on his rope one more time! I pretty much picked up the drift of his concern at that point.

A FEW NOTES ON BASIC CAVING GEAR*

HELMET WITH FOUR POINTS OF ATTACHMENT.
So it does not fall off if you get hit on the head.

BOOTS WITH GOOD TREAD.

OVERALLS OR ADEQUATE CLOTHING FOR THE CAVE ATTEMPTED.

THREE LIGHT SOURCES.

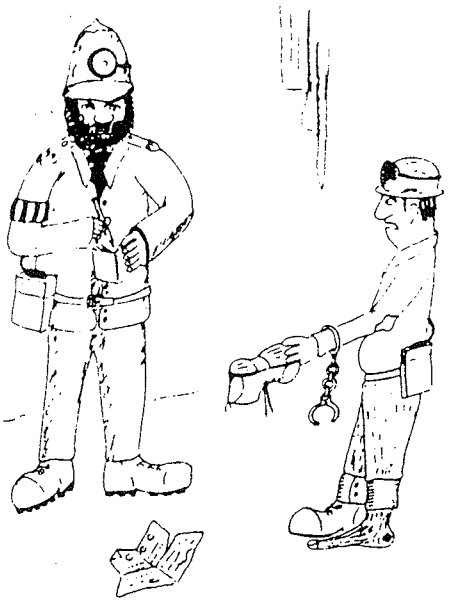
SPARE BULBS FOR EACH OF THE LIGHT SOURCES
Pack them in a smash proof container
such as a film canister or a tabacco tin.

WAIST TAPE 5 METRES LONG.
Made from 50mm rated seat belt tape. Waist tapes come in handy to use as handlines, you can make up foot loops to help people climb up or down. Wrap the tape around your waist or carry it in your caving pack.

TRIANGULAR BANDAGE.
You can make these from an old sheet or the left over protest banner from the last demo you went to. Carry it in your helmet or a pocket.

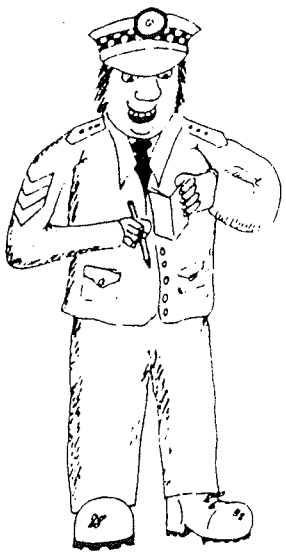
A BAG TO CARRY THINGS IN. A day pack.

"No tread on your boots, no waist tape, and your permit to Blackberry cave has expired. I must take a dim view of this, Sir".



SPACE BLANKET. (Or a large tough garbage bag.)
You can carry this in the top of helmet. Space blankets are designed to keep the body heat in thus helping to prevent hyperthermia.

FIRST AID KIT.
This should contain any personal medication that you are taking, cotton bub,s a compression bandage, cloth bandaids, tweezers, some pain killers, a small container of Betadine or Betadine swabs, a note pad and pen and a small plastic bank bag to put any rubbish in. I also carry Saline solution, to get the dust out of my eyes.



"A hand made scented candle as a primary light source: two sticks of Auroshikha incense as a backup light: and meditation as your third light source! I must warn you that I shall be required to take down any thing you say".

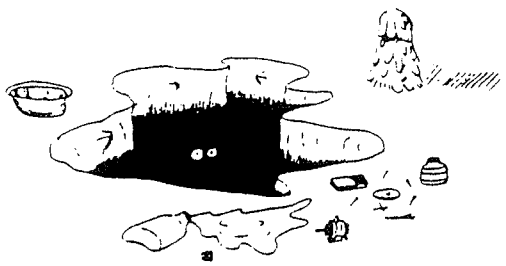
DRINKING WATER.

SOMETHING TO MUNCH ON.
Chocolate, or some energy giving food.

WHISTLE.
You use less energy blowing a whistle than yelling for help if lost.

POCKET KNIFE.

GLOVES.
Helps to keep skin abrasions down and your hands warm.



AN EMPTY WINE BLADDER.
To piss into. Women will need a small funnel.

*** This is for every member in the party, the Leader carries a bit more**

References: ASF Cave Safety Guidelines 1990.

Compiled by C. Buswell

F.U.S.S. Caving Log

DATE of trip	CAVE Name	TIME spent in cave	COMMENTS Please be succinct
9-4-88	Corra-Lyn	3 mins	Lost Theodolyte on level 7. No gibbons found. Altogether a most satisfactory experience
23-5-88	Nullabor	7 mins	Took six hours to find cave due to white-out conditions
24-5-88	Mammoth	2 mins	Blame daylight savings and cheap Cartier swatches.
22-5-88	Kublai Khan	8 hrs 37 mins	Still having trouble with Tardis (Intro. Physics project) Blame PND and Logging companies.

ROPE LOG

(i) Rope description:
(ii) Date of purchase/ where from:
(iii) Cost: $

Trip Description	Date, from : to	Caves Entered.	No of People Trip	No of Abseils	No of ascents	Other
E.G: SRT training	3/3/08-5/3/08	F11 Maires	6	10+ 2 belays	10+ 2 belays	Practiced pulley system set ups, Hauling. Hauled one person out

PTO

RECORD of ROPE WASHING

(i) Rope description:
(ii) Date of purchase/ where from:
(iii) Cost: $

Rope Washed Y/N	Machine	Bath	Creek	Ropewasher	Date	Signature of Who Washed It.

REMARKS : Regarding rope condition, when cleaned, etc

A NOTE ON KNOTS AND ROPE STRENGTH

The below quote is from Al Warild's book *Vertical*.

It is generally assumed that knots weaken a rope because of the tight bends the rope makes as it winds through the knot. This is not entirely true. Consider an 11mm rope with a loop knot [figure of 8 for example] connecting it to a 6mm maillon at one end.

When the rope is loaded to failure, it typically breaks at the point where the loaded rope exits the knot. It does not break at the small radius where it passes through the maillon nor at the minimum radius bend in the knot.

Nylon fibre fails when the stress concentration from pressure and tension is sufficiently high to soften it, in much the same as snow can be melted into a snowball by squeezing it. The rope does not get much hotter, it softens at a lower temperature when under pressure. Inside the knot there is a combination of tension and pressure as the rope wraps around itself and the forces are concentrated to such a degree that the rope fails at a much lower load than it would without the knot.

The way to reduce the strength lost in a knot is to use one which has a maximum of "active surface". That is, one which spreads the pressure over as much rope as possible. This is difficult to determine visually, though generally the bulkier the knot the better it will perform. Any knot is likely to perform better if it is tied neatly rather than with strands needlessly crossing one another creating extra pressure concentrations. The main value of neatness however, is that it makes a knot easier to verify.

Knot strength is not so important with new 11mm ropes which can afford considerable strength loss and still remain safe. When using thin rope, 9mm or less, cavers should tie the best knot available.

I hope that this helps in explaining the forces that are going on in knots and rigging.
'tis...

http://www.animatedknots.com/fig8loopdouble/index.php?LogoImage=LogoGrog.jpg&Website=www.animatedknots.com

Common Knot Tying Terms

Bight. A doubled section of rope usually taken from the center of the rope that doesn't cross itself—compare with loop below (fig 3-4).

The Standing Part of the Rope. Includes all the rope that is not fastened at the rigging point (fig. 3-5).

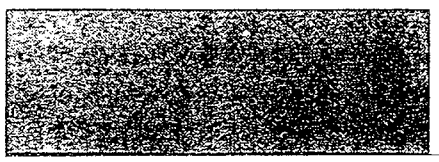
The Running End (or End). Refers to the end that is not rigged or the free end (fig. 3-5).

The Working End. The end that is used to rig with or tie off to something (fig. 3.5).

Loop. A turn of the rope that crosses itself (fig.3-6).

Knot Names.
The names of knots can be an extremely confusing issue. Clifford Ashley, one of the foremost experts on knots and their names wrote a book in 1944 about the subject. He has often been referred to as the last word in knots, yet, 40 years later many knot names have changed.

For example, a common Prusik knot was known to Ashley as the Magnus hitch. When a publication attempts to write a definitive piece on knots, their names and how to tie them, the confusion compounds itself. *On Rope* does not wish to add to that confusion, but rather to present the most common names that are recognized by several sources as well as field experts. With no offense to Ashley, some knots names do not agree with the last word in knots.



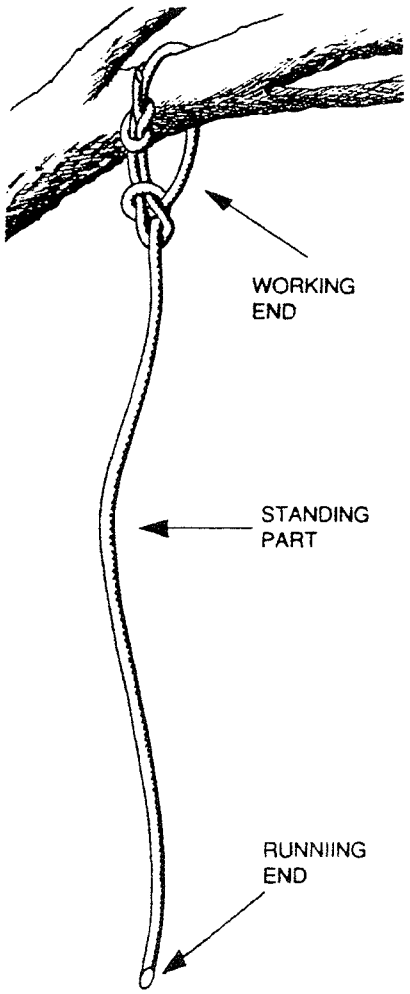


Fig. 3-5. Rigged rope parts.

Categories of Knots.
A majority of rigging/sling knot sources classify knots into three major categories.

- **End-line riggings**
- **Mid-line riggings**
- **End-to-end tie-offs**

The first two types lend themselves to main riggings, while the end-to-end tie-offs have predominate sling application.

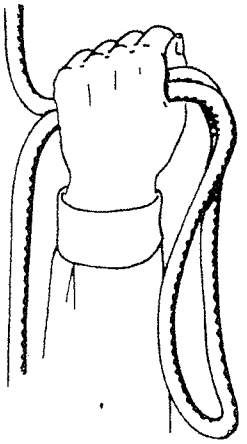


Fig. 3-4. A bight of rope—a loop that doesn't cross over itself.

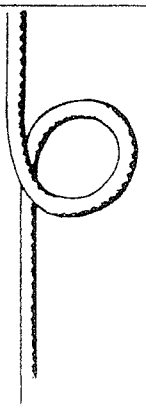


Fig. 3-6. A loop of rope that crosses over itself.

TAPE AND ROPE SLINGS

Slings should be made up from Climbing Tape or Vertical Rescue rope for a wide range of uses. They are ideal for attachment to anchors, improvised rescuer or casualty harnesses and many other tasks.

Climbing tape is available in a wide range of widths, the most common rescue slings being those made from 25mm flat or tubular tape, with a circumference when tied of 1.2 and 2.5 metres.

The following principles must be adopted as standards;-

a) Only Climbing Tape with a minimum width of 25mm should be used for Vertical Rescue operations.

b) Tape must be obtained from reputable dealers in climbing equipment.

c) The minimum recommended breaking strain for tape is 1500kg, and 2000 to 2300kg material should be used wherever possible.

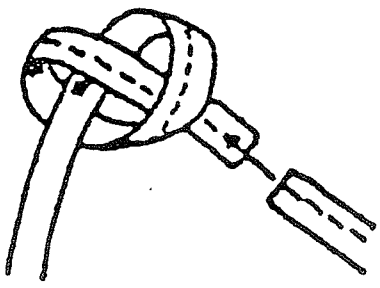
Slings may be made up from any recommended Vertical Rescue rope for applications similar to tape slings. These should be tied with the Double Fishermans Knot.

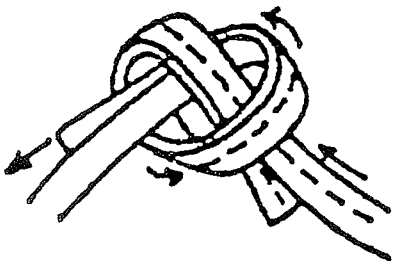
TAPE KNOT

The Tape Knot is also based on the Overhand Knot, and is **THE ONLY recommended method of joining climbing tape.**

A loose Overhand Knot is tied at one end, then the second tape end is taken back through the knot in the opposite direction.

The knot must be dressed down tightly, with at least a 75mm tail protruding from each end.





A Three-Wrap Prusik Knot is used when additional gripping is necessary. Sometimes water or slippery mud may cause the standard two-wrap Prusik knot to slip. By simply addding an additional turn, substantial additional friction can be obtained (fig. 3-b).

A Three Coil Prusik Knot is commonly used when endless loop-wrapping is not possible as with the two and three-wrap Prusik knot. This variation provides gripping power in the top of the knot while reducing friction in the lower part of the knot. This eases upward movement. Commonly used are three , four and five-coil (after Thrun) Prusik knots. It is important that at least two of

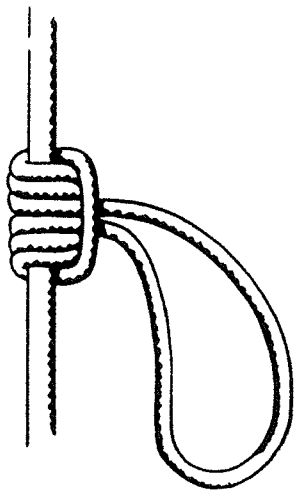


Fig. 3b. An extra turn will form a three-wrap Prusik knot.

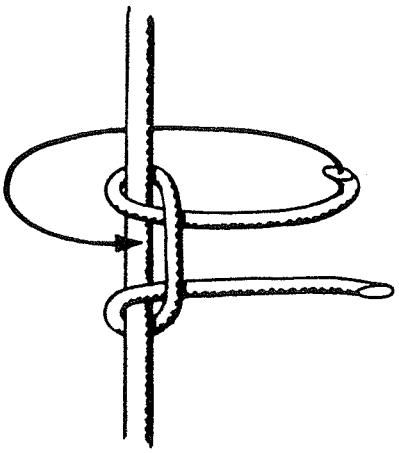


Fig. 3c-1, 2, 3, and 4. By following the tying sequence as shown, three-, four- five-coil Prusik knots can be formed.

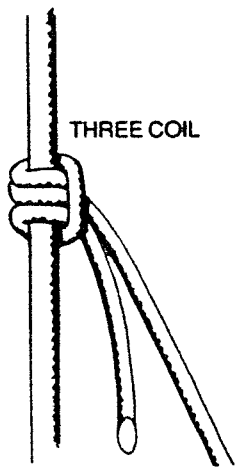


Fig. 3c-2.

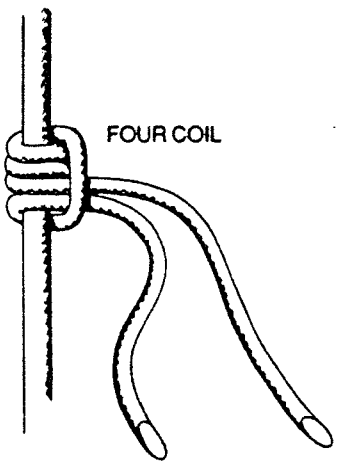


Fig. 3c-3.

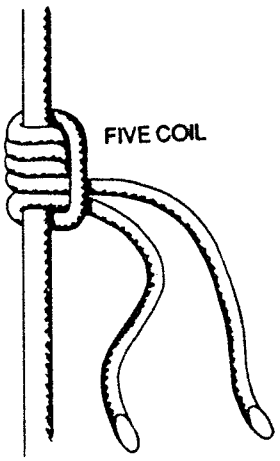


Fig. 3c-4.

ALPINE BUTTERFLY

The Alpine Butterfly is essentially a midrope knot which forms a fixed loop and is ideal for attaching a load parallel to the lie of the rope.

The knot is often used to tie a rescuer to the middle of a rope, or to form a foot stirrup.

A bight is formed in the rope, then the bight is twisted one complete turn. The end of the bight is folded back between the two standing parts and fed through the loop formed by the twist.

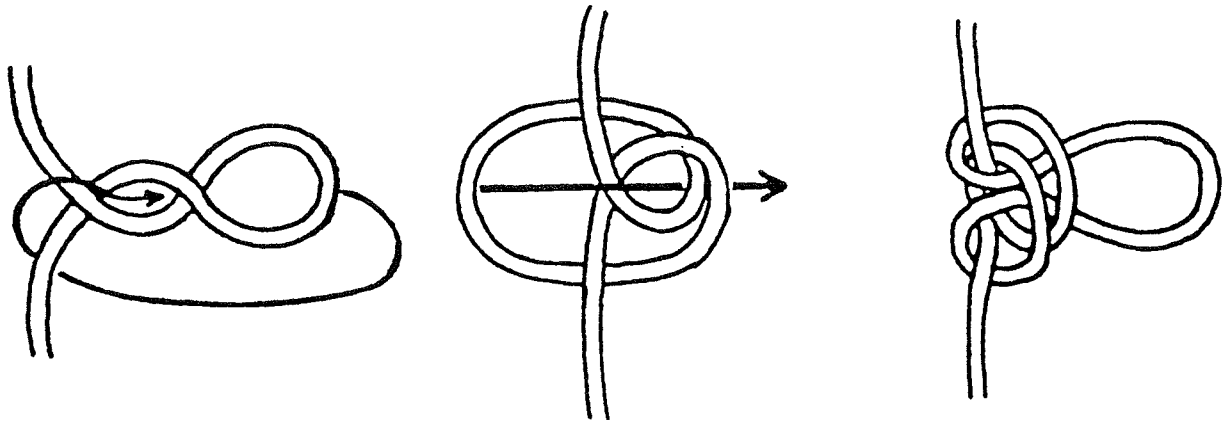


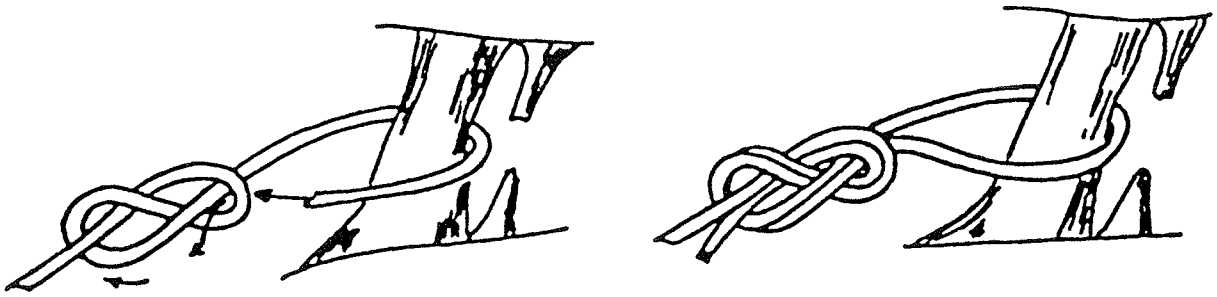
FIGURE 8 LOOP

Figure 8 Loop is also referred to as a Figure of 8 on the Bight, it's correct name is actually the Figure 8 Loop.

For simplicity, the knot is called a Figure of 8 on the Bight when tied free in a doubled rope.

It is referred to as a Figure 8 Loop when tied in two stages around an object such as an anchor.

A single Figure 8 Knot is tied an appropriate distance from the rope end. The running end is then taken around the anchor or other object, and led back through the knot in the opposite direction.



...RMING LOOP
...ROUND ANCHOR

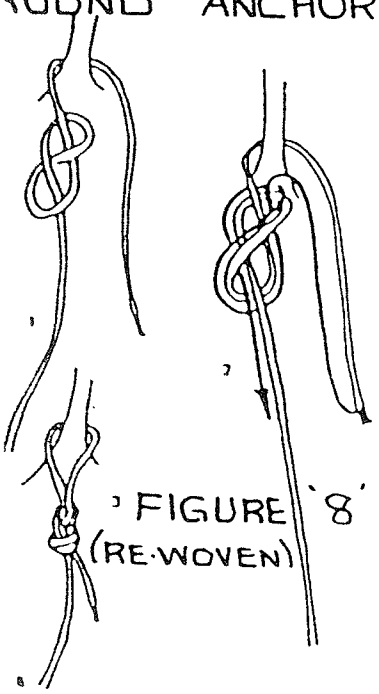
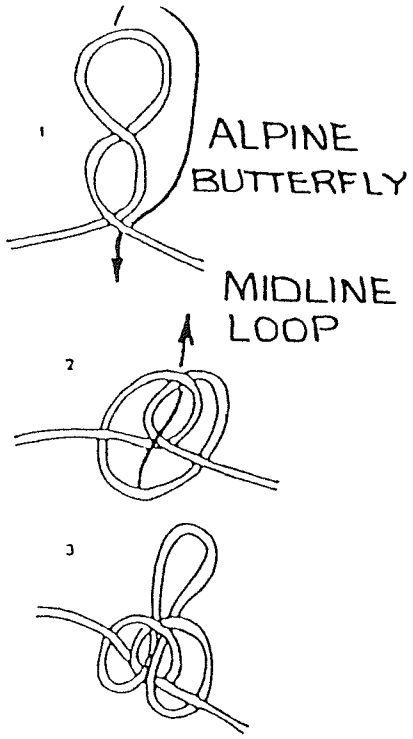


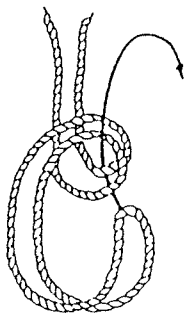
FIGURE '8'
(RE-WOVEN)



ALPINE
BUTTERFLY

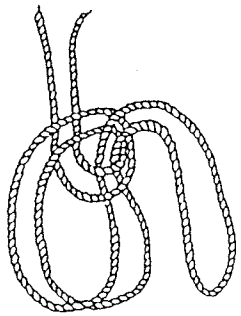
MIDLINE
LOOP

Figure 2a

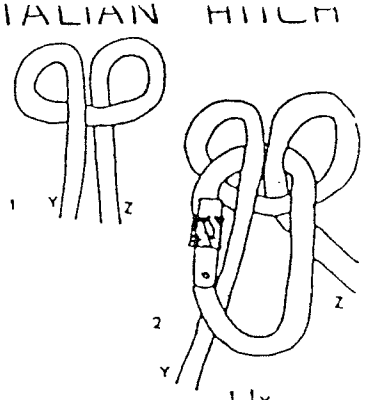


Double rope

Figure 2b



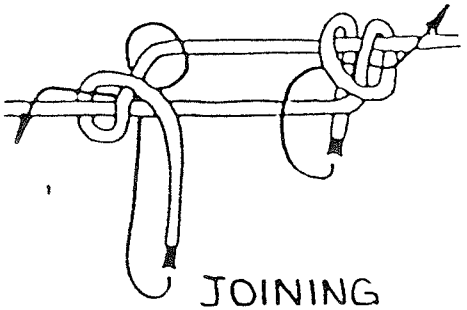
Bight end up through and down



DRAKE
ROPE

BELAY
KNOT

...UBLE FISHERMANS



JOINING
ROPES

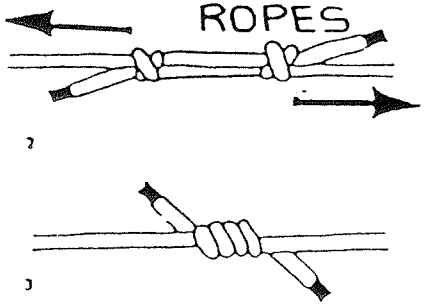
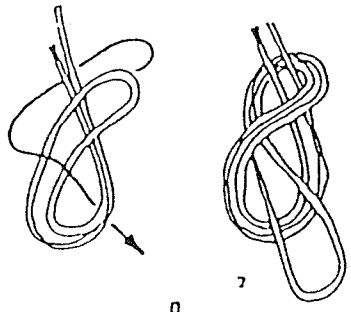


FIGURE '8' LOOP



HARNESS
ATTACHMENT

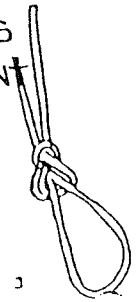


Figure 2c

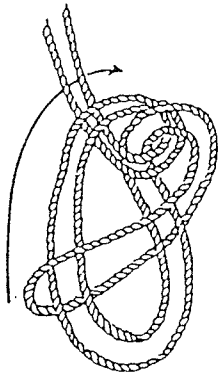
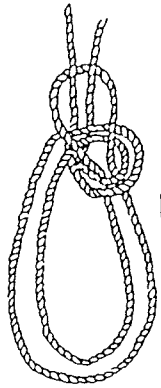


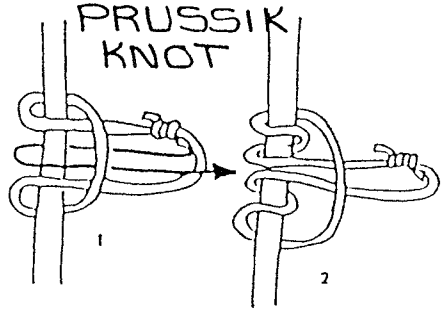
Figure 2d

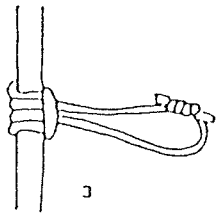


Bring bight up
and around the
entire knot.

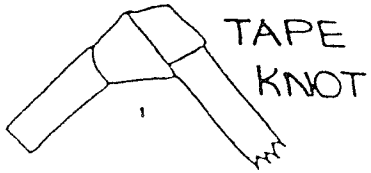
BOWLINE
ON
BIGHT

PRUSSIK
KNOT

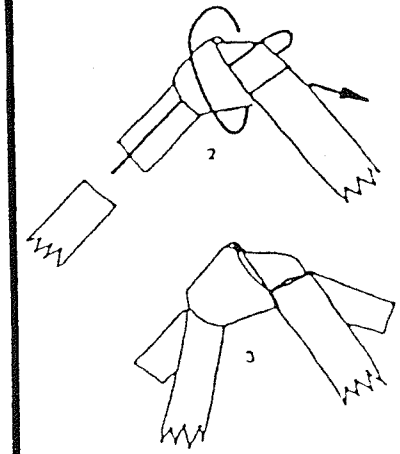




ASCENDING
KNOT



TAPE
KNOT



FORMING SLINGS

SPELEAN TIED HARNESS

(A) A very safe and simple improvised free style harness can be constructed from between 4 and 5 metres of 50mm rated tape.

(B) As shown in Figure 1, a Tape Knot is tied on the bight to form a loop with a diameter of about 50mm. Sufficient tail should be left out of the knot to pass around the thigh, then feed completely back through the knot (in Tape Knot pattern) so as to lock off the leg loop. Once this action is completed, around 75mm of free tail should be left out of the knot.

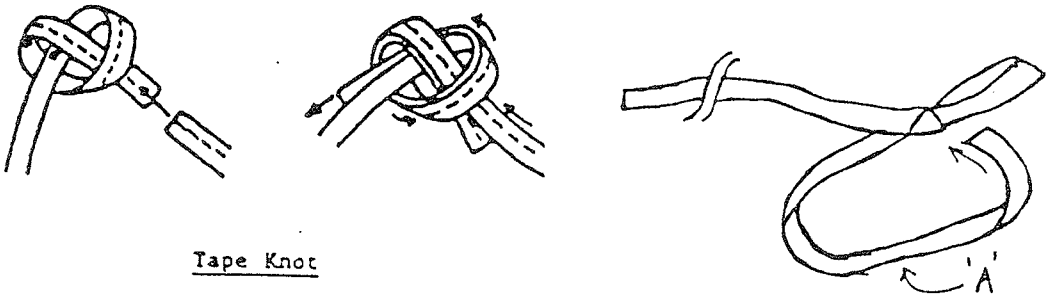
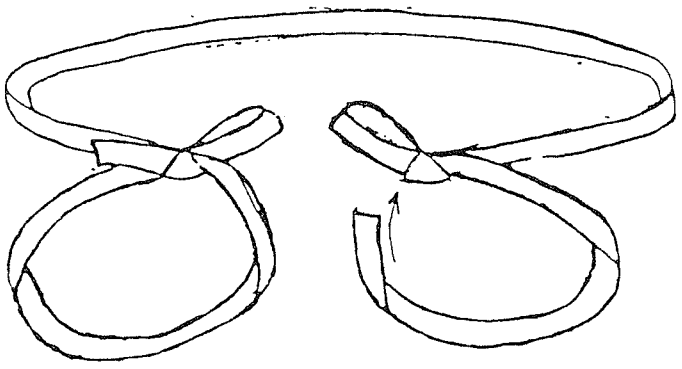


Figure 1

(C) Whilst in a sitting position, the remainder of the tape is taken around behind the body at mid-buttock level. A second thigh loop is formed, once again with a 75mm tail. Both of the 50mm loops should be positioned in front of the body, about 50mm apart, and just below belt buckle level. (Figure 2)

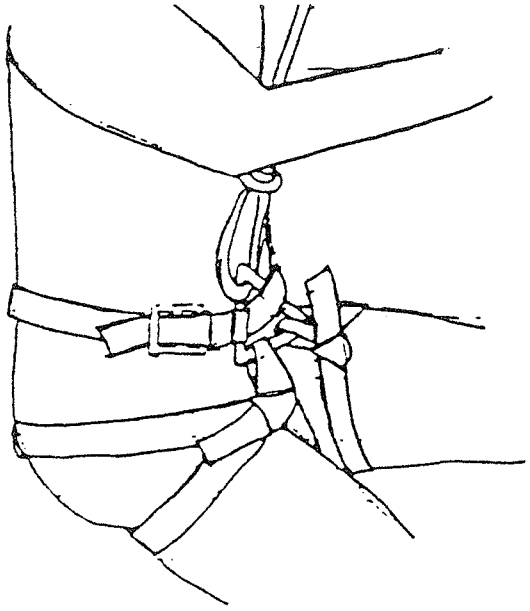


(Figure 2)

Con't p 13

SPELEAN TIED HARNESS

(D) WARNING: The harness must be warn with a rated belt of tape waist line. It is recommended that a delta maillon is used to hold the harness and waistline together, and serve as an attachment point. (Figure 3).
(E) When a waist tape line is set up, a further 3-4 metres of tape is required. The tape is taken around the waist twice and finished with a Tape Knot.



(Figure 3)

NOTES ON RIGGING

BELAYING WITH A LADDER

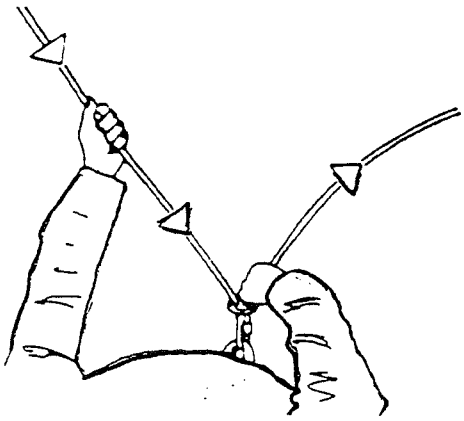
When operating a belay using Static rope, the rope must always be taut This is to reduce the possibility of shock loading the rope, climber and rigging in case of a fall Therefore the person climbing the ladder must not climb any faster than the person controlling the rope Static ropes are used in caving rather than dynamic ropes because of their abrasion resistance qualities

Calls used in belaying can be:
Belayer: "belayer ready"
Climber: "take in, that's me."
Belayer: "climb when ready."
Climber: "up." "stop." "down."
Belayer: "OK", meaning affirmative.
Climber: "safe", meaning finished climbing and off safety line.

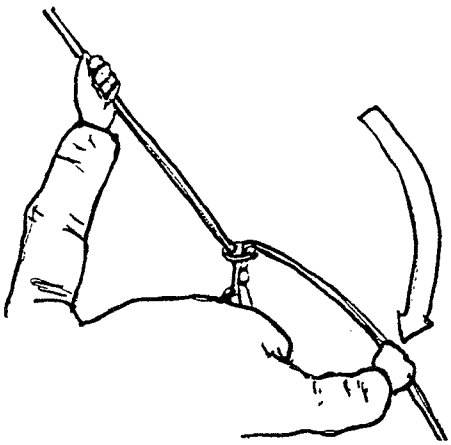
The word "slack" should NOT BE USED in calls as it is ambiguous and could mean either "up or down."

Reference: Australian Speleological Federation Inc. *Cave Safety Guidelines*.

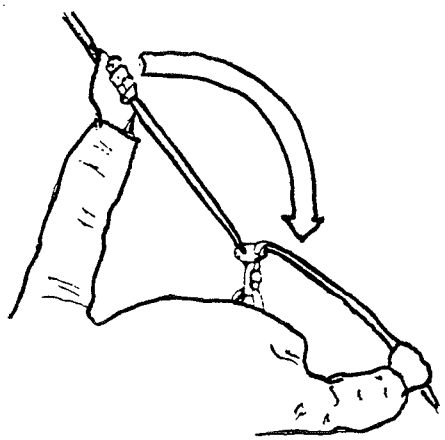
five-step belay method



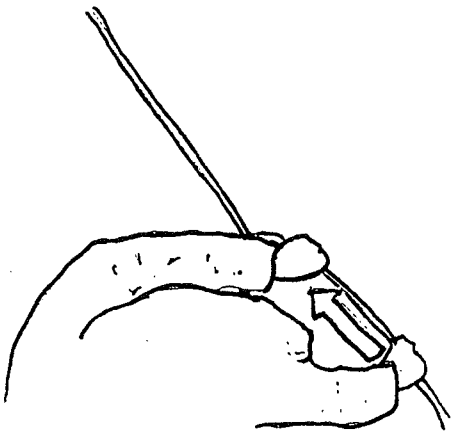
the rope is fed back into the belay device by the guide hand and pulled through with the brake hand



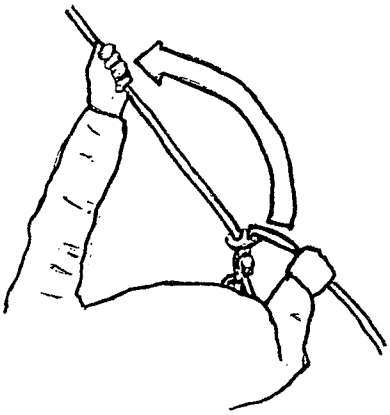
the brake hand now locks off the rope



the guide hand lets go of the guiding side of the rope and firmly grasps the brake rope next to the belay device.



slide the original brake hand along the rope until both hands meet.



the original guide hand lets of of the brake rope and returns to grasp the guide rope

From: Highland Caving Group Members Training Manual. Version 1. 2010

	In-line type	**Figure 8 type**
Rope path	Straight through-recommended	Twist through-not recommended
E.g:	• Petzl Stop • SRTE Stop-single/double • Whale tail • Goldtail • Racks • Crossed karabiners 	• Figure 8 • Harpoon • Twisted knot on karabiner • CMS • Huit • Pirana 
Advantages	• Rope is in line • No twist in rope • Less wear • Rope turns gentle angles • Good heat sink • Variable friction • Can be detached from rope without being disconnected • Petz/SRT Stop: self breaking • SRTE Stop: descent stops if handle is squeezed in panic	• Easy to use • Easy to teach • Inexpensive • Light • Compact
Disadvantage	• Some bulk • Complex • Rack: requires a French knot • Petzl/SRTE Stop: requires an extra krab • Petzl Stop: descent continues if handle is squeezed in panic	• Twists rope • More rope wear • Often poor heat shrink, dissipate heat slowly • Fixed friction • Not enough friction for heavy loads (rescue) • Lock up (larkshead) • Disconnect to detach from rope

Designed and manufactured in Australia

SINGLE ROPE TECHNIQUE EQUIPMENT [SRTE]

9 Nelson Avenue
Padstow NSW 2211 Australia
Phone: (61 2) 9796 3455 Fax: (61 2) 9796 3488
Email: sales@srte.com.au Website: www.srte.com.au

SRTE Stop Descenders

Thankyou for selecting one of the very few true Stop Descenders available on the market. We at SRTE are confident that you will be happy with your acquisition. If you have any questions or product suggestions relating to this or any other product in our range, please do not hesitate to contact our Customer Service Department at the above address.

The SRTE **Stop Descender** has a unique design. It is the first **Stop Descender** available with the option of a Secondary Safety Brake letting you manage what happens when the descender is 'Grabbed in Panic' or handling you safely if you are unconscious.

Models available:
Since its original invention in 1982 the SRTE **Stop Descender** has been continually developed and improved. There are currently six models available with either all stainless (silver only) or aluminium cheeks (anodised in a variety of colours) with stainless handle. The Disarming Pin suits all models and deactivates the Auto Stop Mechanism making the unit a manual in-line descender.

SRTE Standard Stop Descender Range	**SRTE Double Brake Stop Descender Range**
D1a ~ Single Rope **Stop Descender**	D1DBa ~ Single Rope Double Brake **Stop Descender**
D2a ~ Double Rope **Stop Descender**	D2DBa ~ Double Rope Double Brake **Stop Descender**

ALL MODELS AVAILABLE IN STAINLESS STEEL

The Double Rope Version takes both single or double rope whereas the Single Rope Version may only be used with single rope.
The Brake Attachment on the Double Brake Version is easy to remove or add. Note: the warranty is void if you make any non-factory approved adjustment.

Points to note:

- How to thread the rope through the **Stop Descender** is stamped permanently on the front cheek of the Descender.
- The rope should flow freely through the **Stop Descender**; however, when conditions are at their worst, e.g., wet and muddy conditions, descending may be extremely slow and difficult on stiff or larger diameter ropes. In such conditions, you should modify your rappelling tactics accordingly.
- The Handle is the primary control mechanism – squeeze to go (all models) – let go to stop (all models) – squeeze hard to brake (Double Brake models only).
- Hold the tail end of the rope at all times not only for balance but also as your secondary speed control mechanism.
- SRTE recommends that you use a safety belay at all times.
- Descenders may creep if they are not on the correct rope setting for the rope being used.
- **Stop Descenders** only halt decent; therefore you should be locked-off if you intend to be stopped for any length of time, thus making sure you are completely secure.
- At the factory we set all Standard and Double Brake **Stop Descenders** for 11mm rope, the most commonly used size. However, you can adjust the Descender to suit the rope you are using, providing the rope is between 9mm and 12mm. Note: the warranty is void if you make any non-factory approved adjustment.
- When using the Standard or Double Brake **Stop Descender** you can thread the tail end of the rope through the Second Braking Post for additional friction. Using this additional friction ensures that there is always pressure on the tail end of the rope, decreasing the chance of the Descender creeping. SRTE recommends that you use the Second Braking Post in situations where you intend to descend with large loads or if you intend to rescue a victim, thus placing the victim's weight on your, the rescuers, descender. The second braking post must be rigged prior to descent, unlike SRTE Goldtails or SRTE Rappel Racks, which, during descent, can alter the thread pattern of the rope. In other words, you must rig the Descender correctly for the task ahead.

HOW TO USE YOUR SRTE STOP DESCENDER

This instruction sheet is not a fully comprehensive instruction manual.
Contact TRAC INTERNATIONAL on (61) 0418 674 678 for information on SRTE approved Training Courses.

Attach the SRTE **Stop Descender** to your SRTE Sit Harness using an SRTE Karabiner, with the **Stop Descender's** handle protruding to the left and pointing down. You may need to use 2 karabiners to get the descender in the correct position for descending; your descender should be positioned no higher than your shoulders to minimise the risk of your hair or clothes getting caught in the descender.

A – BEFORE YOU START

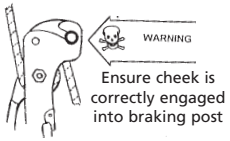
1. Hold the SRTE **Stop Descender** in your left hand, the handle to your left.
2. Attach the SRTE **Stop Descender** to your harness.
3. Push the trigger on the front cheek inwards to open karabiner hole.
4. Swivel the front cheek to the left to allow the rope to be threaded.
5. Thread the rope, going from left to right. Thread the rope under the lower sheave on the handle – up and between the lower and top sheave on the handle – over the top sheave and between the braking posts. For less friction, by-pass the second (lower) braking post – refer to the diagram.
6. Close the front cheek – swivel the cheek to the right – the catch should click as it passes over the karabiner.
7. Ensure that the cheek is correctly engaged into the braking post.
8. Be sure to remove slack between you and the anchor point.
9. Test the descender to make sure you have threaded it correctly and that the descender is working properly – the Handle should be in the normal position with no rope slippage.

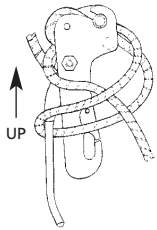
B – DESCENDING

1. Your right hand must control the tail end of the rope at all times, while your left hand is at the base of the handle for maximum leverage; gently squeeze the handle to descend (all models)
2. The more you squeeze the faster you go (except Double Brake Models).
3. Let go to stop (all models). Only on the Double Brake Models will your descent slow if you squeeze too hard.
4. **Caution**: Do not descend at a rate that will cause overheating. During your descent, occasionally slide your finger up the handle; if it's hot, slow down – do not stop as the heat from the descender may put a weak spot in the rope.

C – LOCKING OFF

1. Lock-off – bring the tail end of the rope up and between the head of the descender and the incoming rope.
2. Place a half hitch over the head of the descender.
3. Unlock – using a firm grip, remove the tail end of the rope from between the head of the descender and the incoming rope – never let go of the tail end of the rope.
4. Squeeze the handle when you are ready to descend.





D – MAINTENANCE

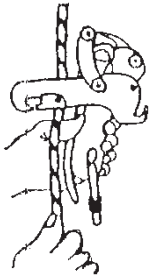
1. Wash your descender in clean water only if it gets gritty – the handle will be stiff if your descender is gritty.
2. After washing, oil the spring on the back cheek near the pivoting bolt and the karabiner trigger spring.
3. If the handle squeaks, oil it.
4. If the braking post wears, it may be rotated three times before you need to replace it.
5. Your Quality System may require items to be returned to the manufacturer for periodic service; please contact our Customer Service staff before returning your SRTE **Stop Descender** to us for service.

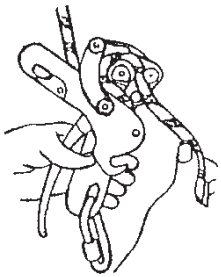
E – ROPE ADJUSTMENT

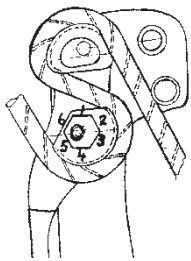
You can make fine adjustments to the for friction settings for using different rope diameters; this makes the handle slightly harder to squeeze when the maximum friction setting is obtained, and it makes the handle slightly easier to squeeze when the minimum friction setting is set. Note: the above adjustments work in reverse when braking.

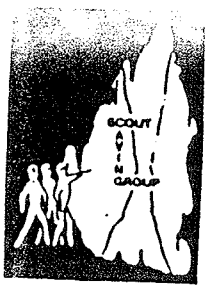
Rope Adjustment
Pivot Bolt nearest to #1 = Maximum Friction
Pivot Bolt nearest to #5 = Normal Position (factory setting – 11mm)
Pivot Bolt nearest to #4 = Minimum Friction
Remember, the warranty is void if you make any non-factory approved adjustment.


DISARMING PIN









SELF - LINING

C.E.G.S.A.

The use of a flexible cable ladder, a fixed static rope and a mechanical ascender as a self-belay is a technique known as self lining.

This is an alternative method of life lining a ladder pitch to the traditional life lining methods involving a belayer at the top or bottom of a pitch.

ADVANTAGES

1/ Quick on/off time at the ladder pitch.
2/ There is a good transfer of rigging techniques and equipment use from self lining to single rope techniques (S.R.T.)
3/ Each party member is self reliant.
4/ Less rope is used in rigging.

DISADVANTAGES

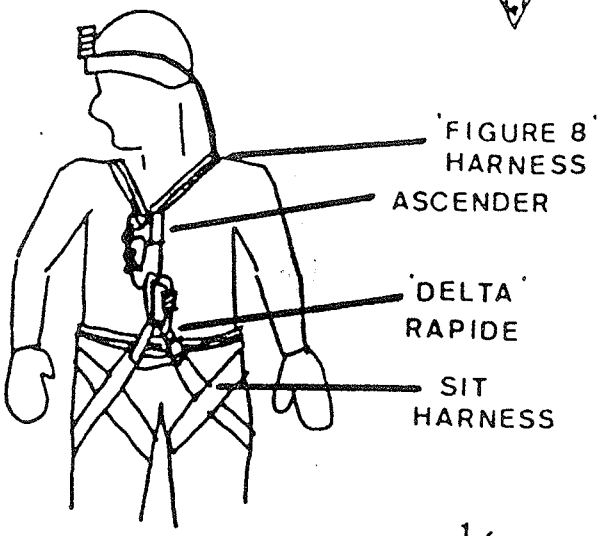
1/ The technique is gear intensive i.e. everybody requires a personal rig.
2/ Each caver must have a higher level of expertise in the use of the equipment than is expected for traditional life-lining.

In utilising self lining techniques each caver has an abseiling device and a self lining rig to use at the ladder pitch. Every party member abseils into the cave and ascends the ladder using the mechanical ascender as a safety on the fixed rope used for the abseil OR the party leader uses these techniques and uses a traditional belay for the majoritory of the party.

A typical self lining rig is illustrated by figure 1.
Essential Components are:

1/ Sit harness
2/ A mechanical ascender
3/ A chest harness or adjustable neck loop.

Judson (1984) illustrates that the ascender should be placed on the side of a harness (presumably so that the rope doesn't "clutter" the ladder or the ascender catch on the rungs).



1/

A SELF LINING RIG

These problems are minimised if the ascenders used are placed "flat" against the chest. (See figure 2.)

By using a chest ascender in this manner it is easy to convert a self lining rig into an S.R.T. rig by attaching the foot loop safety sling to the main harness attachment. (preferably a delta rapide) (See figure 3.)

In this way one can develop a caving rig which will serve both functions.

Spring loaded ascenders eg. Jumars, Petzl, CMI etc and camming ascenders eg. Gibbs, both work well, the advantage with a Gibbs is that it is reputed to take shock loads better, but it is much slower on/off the rope.

USING THE SELF LINING RIG

To use a self lining rig attach the ascender to the rope, check all karabiners and adjustments, then climb the ladder as you would normally.

If the ascender "catches" the rope, have a party member hold the rope for you or weight the rope by tying the excess into a coil which hangs off the ground.

DO NOT ALLOW YOURSELF TO HAVE A SLACK ROPE this could cause a severe shock load to you and your anchors via your static rope, should you fall.

VERTICAL TRAINING CHECKLIST

NAME:

TOPIC: Helmets

SKILL	COVERED	TRAINER	INITIAL	DATE
Suitable Vertical Helmet				

TOPIC: Knots

SKILL	COVERED	TRAINER	INITIAL	DATE
Figure 8				
Rethread Figure 8				
Tape Knot				
Alpine Butterfly				
Double Fishermans				
Prusik				
French Prusik				
Bachman knot				
Klemheist Knot				
Figure 9				
Bowline				
Bowline on the bite				
Italian hitch				
Dressing Knots				

TOPIC: Harnesses - using different types

SKILL	COVERED	TRAINER	INITIAL	DATE
Manufactured				
Tape Harness				
Nappy Harness				
Tied Harness				

TOPIC: Rigging - Anchors - Different Vertical Techniques

SKILL	COVERED	TRAINER	INITIAL	DATE
Selecting Anchors				
Natural Anchors				
Manufactured Anchors				
Bolt Anchors				
Basic Rig				
Multiple Anchors				
Rig from car - no tow bar				
Rig from Tow Bar				
Rigging for rescue or change				
Rope Protectors				
Rig Ladder				
Rig Ladder Belay				
Abseil				
Abseil - Top Belay				
Self Lining				
Basic Belay				
Rebelay				
Redirection				
Traverse				
Tyro Lean				
Cordelette				
Joining Ropes				
Use of Stays				
Use of Spreaders				

TOPIC: Individual Skills

SKILL	COVERED	TRAINER	INITIAL	DATE
Set Up SRT gear on Harness				
Ladder - on belay				
Ladder - self lining				
Abseil				
Abseil - freehanging				
Prusik - Hard Ascenders				
Prusik - Soft Decenders				
Rebelay				
Redirection				
Pass a knot				
Pass a Rope Protector				
Traverse				
Tyrotean				
Cordelette				
Belay using belay device				
Belay using decender				
Belay using Italian Hitch				
Abseil on double rope				
Abseil - Rack				
Abseil - Whale Tail				
Abseil - Stop				
Abseil - Belay Device				
Abseil - Crabs				
Abseil - figure 8				
Use of cow tail				
Chimneying				

TOPIC: General Skills

SKILL	COVERED	TRAINER	INITIAL	DATE
Coil Rope				
Chain Rope				
Coil Ladder				
Label Gear				
Check Gear				
Storing Gear				
Cleaning Gear				
STATIC Rope				
Dynamic Rope				

8e: Common chemicals and their effects

Shown in the table is a selection of common chemicals likely to be found in or around ropes, usually in storage or transport. The effects of rust and water are discussed elsewhere. The data comes from research conducted by DMM, Troll and many others, and has been published all over the place in various chunks - most recently in the British Standard BS8437[12]. The results all apply to brief exposure at room temperature (20°C) and the effects usually get worse with higher temperatures or long-term exposure.

Of course any exposure of critical equipment to a damaging chemical should be grounds for destruction of that equipment. Often the damaging effects take weeks or months to become critical, but equally a thorough washing of the offending item will not restore the strength already lost. Where we have no current data, or the data is contradictory, we've left the cell blank.

Chemical	Polyamide	Polyester	Polypropylene	HMPE	Aramid	Vectran
Acetic Acid 10% in water	L	N	N	N	N	N
Ammonia 10% in water	L	C	N	N	N	N
Aviation fuel	N	N	L	N	N	N
Blood	L	L	L	N	N	N
Brine (sea water)	N	N	N	N	N	N
Carbon dioxide gas	L	N	N	N	N	N
Chlorine gas	D	L	D	C		N
Chlorinated water	N	N	N	C		N
DEET	N	N	N	N	N	N
Hydrochloric acid 2%	L	L	N	N	L	L
Hydrochloric acid 10%	C	L	N	N	C	C
Motor oil	N	N	L	N	N	N
Nitric acid 10%	D	N	N	N	C	L
Petroleum fuel	N	N	L	N	N	N
Sodium Hydroxide 10%	N	L	N	L	L	N
Sulphuric acid 10%	C	L	N	N	L	N
Sulphuric acid 50%	C	L	N	L	D	L
Turpentine	N	N	C	N		
Urine	N	N	N	N	N	L
White Spirit (Stoddard solvent)	N	N	C	N	N	

KEY: N = no effect L = limited effect C = considerable damage D = dissolved

To summarise the most interesting data in the table:

- HMPE is almost immune to everything, except vicious acids and alkalis, but it does not like chlorinated water. Beware of swimming pools!
- Almost every rope will disintegrate if exposed to chlorine gas. You can make chlorine by spilling some acids on limestone. Only the more esoteric polymers like Vectran are immune to chlorine gas.
- Lead-acid batteries use about 40% strength sulphuric acid, for comparison to the above figures.
- Vomit is typically 10% hydrochloric acid, along with assorted enzymes and three diced carrot chunks.
- Polypropylene dislikes engine oil, petrol and kerosene. Almost everything else doesn't care - so despite what you may think, spilling petrol on your rope or harness doesn't damage it. Burns well though...

HOW TO MAKE ROPE WASHERS THAT WORK AT A REASONABLE COST

Clare Buswell

I would like to thank Ivan Riley for his experiments with all of this.

How many of we main land cavers trundle off to Tasi, and spend heaps of time scrubbing ropes in streams with a hand held scrubbing brush? It is a real pain in the hands as the creek is usually freezing and it all takes forever. So a couple of years ago some experiments turned up the following. I have tried to make the instructions as simple as possible and hope that anyone can follow it.

Introduction.

1). Things to know about plumbing bits.

Firstly plumbing bits come in different colours and in the real world of plumbing these colours are associated with different purposes. For these rope washers, grey, white and black is used. Grey is used for sewer or down pipes. White is for high pressure and is used for internal plumbing, and on pools etc. Black is poly pipe and is used in the garden for setting up sprinkler systems etc. The high pressure stuff is the most expensive.

All plumbing bits have a size and a production ID number on them. I have given these numbers/IDs here to aid in getting the right bits. The components used in these rope washers are from four plumbing manufacturers: Hardie, Iplex Philmac and Hansen. All of the plumbing bits used here, you can get from you local hardware store.

When gluing sewer and high pressure pipe to other bits use solvents and glue known in the trade as “pink and blue”. Pink is a cleaner/primer, which roughens the plastic and so makes for a better binding surface before gluing with blue. When using Pink and Blue, wear gloves and do it out side. You will not need a great lot of Pink and Blue so, unless you are going to do some plumbing at home buy small containers of it. ONLY glue things together when you have *all* the components and have *experimented* with how it all works.

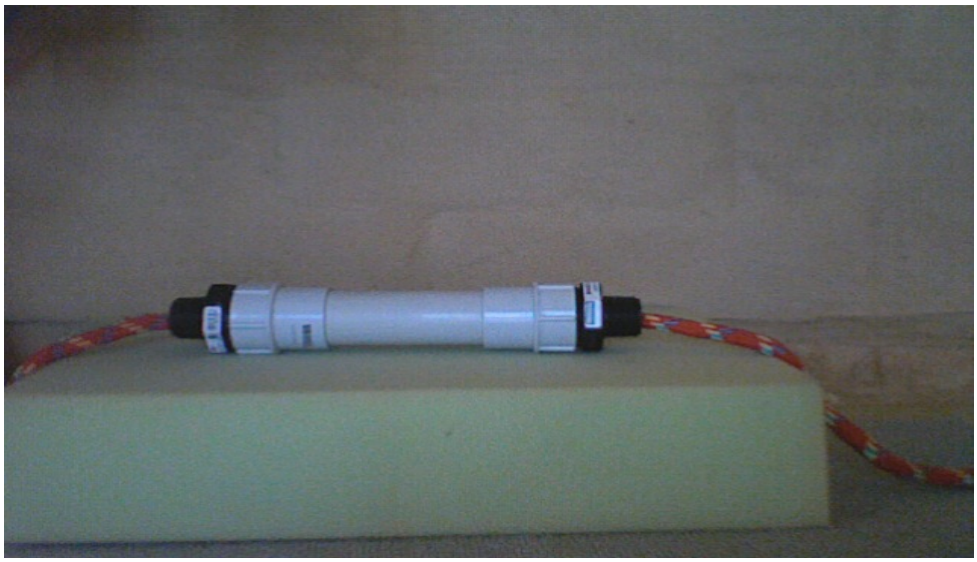
2) Brush Makers

You will find them listed in the Yellow pages.

You will need to spend time demonstrating and talking with the brush maker about what you want and how long you want the brushes to be. Do not be afraid to canvas the skills of a couple of brush makers. So shop around. Importantly the length of the brushes that they make is contingent on the length of the wire that they twist to make up the brush. Use Stainless steel wire.

Rope Washer For the Creek or the Bath Tub.

This is for used with two people, to wash ropes in a creek or bath tub. One person stands/holds the rope washer under water and the other person pulls the rope through the washer. When I have used this, I generally pass the rope through it twice. Once in either direction, but it depends on how dirty the rope is.



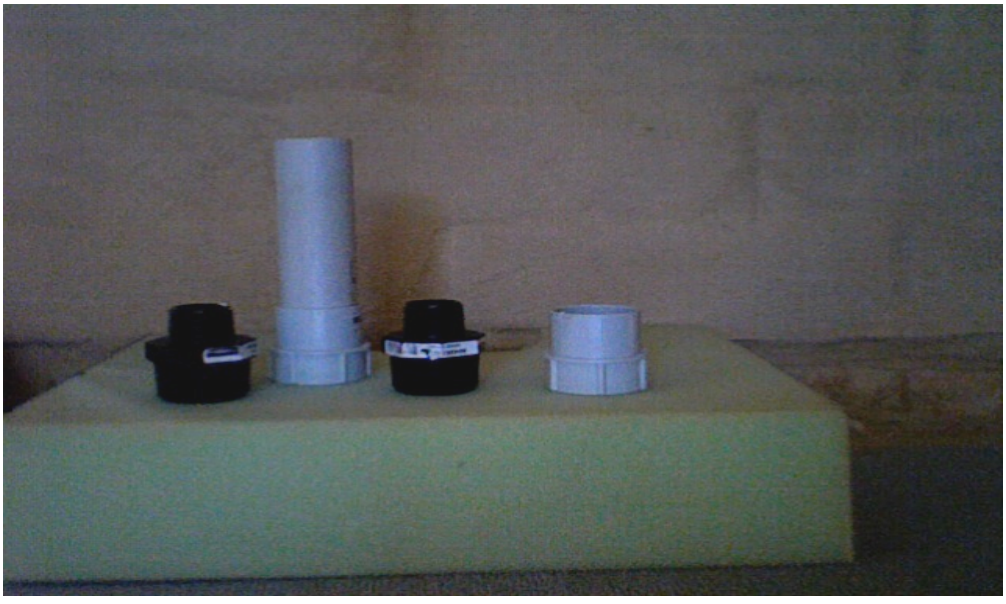
The Creek Rope Washer.

You will need the following:

1) Black poly: 2 X reducing bushes 40mm/25mm (1 ½ inch X 1 inch). These are also known as nipples and the type I have used, are made by Philmac. Cost $3.15 ea

2) A length of grey sewer 40mm pipe. It is the size that fits D cell batteries. The piece I have is 15 cm long, so I can stand on it in the creek.

3) Grey sewer: 2 X female threaded coupling 40mm. Iplex AS/NZS.1260. DWV 112.40. DO674040. Cost 2.80ea



Components of the Creek Washer

4) Glue only ONE end as: a) YOU NEED TO BE ABLE TO FIT THE ROPE AND BRUSHES INTO.

b) You will find that friction will keep the other end in place as you pull the rope through it. Also you only ever pull the rope through the glued end.

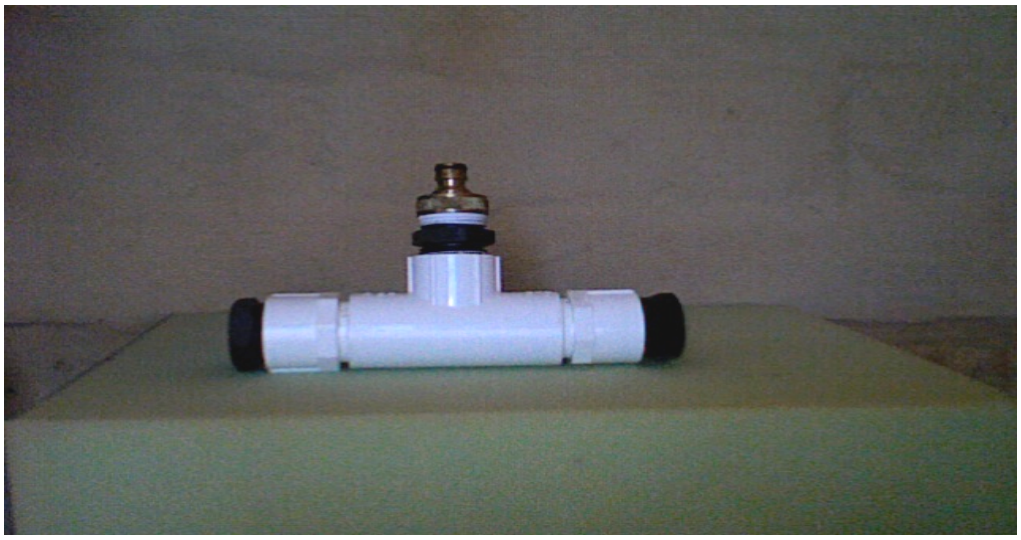
Creek washer with one end glued. Leave the other end unglued.

5) The total length of this washer is 28cm.

The brushes are 13cm long and I use 6 brushes on 11mm rope.

Rope washer attached to the garden hose.

The best way to use this beast is to run the rope between a couple of poles/trees/cavers or whatever else is at hand and tension it with a couple of ascenders. Then it is just a simple matter of connecting the hose and running the washer up and down the rope a section at a time.



The hose washer assembled.

You will need the following:

1) Brass or plastic clip on hose fitting. Screw fitting on one end and clip fitting on the other.

2) 1 X 25mm (1") Nipple. Black Poly. Philmac. Cost: $1.90

3) White high pressure, 1 X female Tee Faucet reducer. 32mm X 25mm. PO213225. PN18 AS/NZS.1477. Hardie. Cost: $9.50. This is threaded so the hose fitting can go into it.

4) White high pressure. 2 X female Faucet adapter 25 X 32mm. No18/3. AS1477. CLI8. Hardie. Cost:$3.70 ea. (Plain on the male end: - 25mm, and threaded on the female end:- 32mm.)

The Hose washer components

5) Black poly. 2X Hansen SRB3220. 1 1/4" X ¾" poly bush. Cost: $2.95ea. Philmac also make this but I don't know the part number so look around for them if you can't find the Hansen ones.

6) When you have the brushes then glue only ONE END TOGETHER as below, and screw the rest into it.

The hose washer with ONE end glued and the other
ready to be assembled and which is NEVER Glued.

7) Total length of this washer is 17 cm.

The brush maker.

Take the **un glued** rope washers to the brush maker with a piece of 11 mm or what ever rope diameter that you use the most. Ask him or her what is the longest brush they can make. The brushes for mine are 13cm long. (You should be able to get a brush longer than this.) The brush width is 5mm either side of the wire. Total width including the wire in the middle is 14mm. I have six of them because the sewer pipe is 40mm and the hose washer is 32mm, internal measurement. In the hose washer I use five brushes and the creek uses six. The 10mm Edelrid washes better in the hose washer then in the creek washer and the 11mm Blue Water 2 Plus washes better in the creek washer. Demonstrate to the brush maker what you want and leave the whole lot with them so they can experiment with it and make up brushes to suit.

A Brush in scale with the creek washer.

This is what the brushes look like.

Comments.

When you are in the hardware store, fit all the plumbing bits together. You can if you want, make up a washer using larger diameter pipe. It is really personal preference, as is the length of the washer. The brushes that I had made up cost $30.00. So that works out at 15.00 for brushes for each washer. Stainless steel wire was used in my brushes so the cost could potentially be reduced by using ordinary mild steel or galvanized wire, but considering the intended use, it is worth the extra to invest in stainless. It is also important to smooth off the ends of the brushes with an angle grinder, rub them on rough concrete or whatever to remove the risk of rope damage from any sharp edges.

In terms of cost, the creek washer cost $15.00 for the brushes and $11.50 for plumbing bits, plus a bit of 40mm sewer pipe I had hanging around in the shed. So around $26.50.

The garden hose washer cost around $40.00, mainly due to the cost of high pressure fittings. I expect that these rope washes will never wear out. By the way of comparison, the Dobi rope washer that is commercially available retails for around $44.00 and does not fit onto a hose and is not as sturdy. Have fun.