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Lumen in Tenebris

SUSS

FOUNDED 1948

Caving Information Special Edition

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Sydney University Speleological Society

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Caving Information Special Edition

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* Reprinted from P.G. Matthews(ed.) 1985: *Australian Karst Index 1985*

Preface

Information on caving is generally poorly transferred between cavers, which is unfortunate as standards tend to decrease and less constructive caving occurs. SUSS members have not been prolific in surveying in the recent past (probably sterile actually), so this bulletin has grown from wanting to reprint the Cave Survey and Map Standards in an attempt to reverse this trend. Articles which I have used, plus others that have been completely unknown to me until recently are also included. It is significant that most of the reprints were initially published before the current generation of cavers joined SUSS, and it is hoped that this information is also available to future new members. To those members that already have the following reprints, this bulletin should assist by having the information easily retrievable. The SUSS constitution (SUSS Bull. 23(4) - Feb. 1984) would of also been reprinted , but it may be amended in the near future.

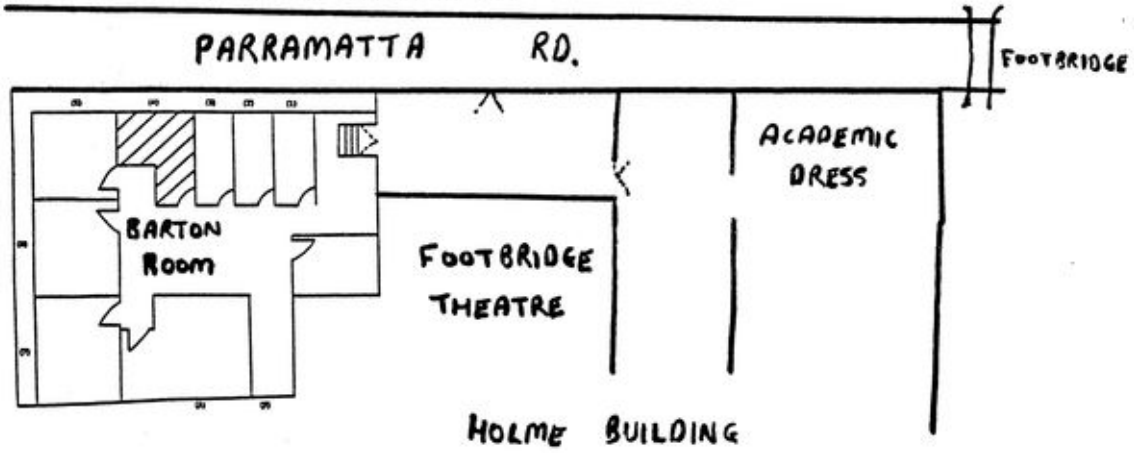
Martin Scott

Acknowledgements

Keir Vaughan-Taylor and Greg Wilkins assisted in the preparation of this bulletin, which would not of been even plausible if the authors of the reprints had not written them in the first place.

Meetings

SUSS has general meetings on the first Thursday of each month (always March-November, otherwise occasional) in the Common Room, Holme Building at 7.30 pm . Committee meetings which are open to all members, are normally held in the Barton Room (see below) , Holme Building on the Tuesday in the week preceding the general meeting (ie. 9 days before) at 7.00 pm or thereabouts.The SUSS room which houses the library and equipment is also in the Barton Room.



SUSS Publication Listing 1948-86

Circulars were produced from 1948-1960 but no list of their frequency of publication is presently available.

SUSS Journal

Year	Volume	Numbers
1950-53	i	1-3
1955	2	1,2
1956	3	1,2
1957	4	1,2
1958-59	5	1,2
1960-63	6	1-4
1966-68	7	1,2

SUSS Yearbook- annually 1957-1967

SUSS Newsletter (New Series)

Year	Volume	Numbers
1961-62	1	1-9
1962-63	2	1-9
1963-64	3	1-6
1964-65	4	1-7
1965-66	5	1-6
1966-67	6	1-10
1967-68	7	1-5
1968-69	8	1-9
1969-70	9	1-4,....?
1970-71	10	1-9

SUSS Bulletin

Year	Volume	Numbers
1971-72	11	1-8
1972-73	12	1-6
1973-74	13	1-11
1974-75	14	1-12
1975-76	15	1-11
1976-77	16	1-8
1977-78	17	1-7
1978-79	18	1-4
1979-80	19	1-5
1980-81	20	1-11
1981-82	21	1-8
1982-83	22	1-8
1983-84	23	1-4
1984-85	24	1-4
1985-86	25	1-3
1986-	26	1-3,.....

If you have any corrections or more information about the list, correspondence would be appreciated.

Section 1 : General Requirements

Trip leaders must have a working knowledge of the following :

1.1 Rope choice : dynamic versus static.

1.2 Basic rope knots including the:
- Figure of Eight
- Bowline
- Tape
- Prusik
- Double Fishermans

1.3 To be able to assess the security of natural and artificial anchors.

1.4 To rig in such a manner as to minimise the risk of anchor or equipment failure.

1.5 To be conversant with voice and whistle calls for laddering and S.R.T.

Section 2 : Laddering

2.1 To be able to set up and operate a ladder and belaying system.

2.2 To have a working knowledge of a body belay system.

2.3 To have a working knowledge of a mechanical belay system.

2.4 To have a working knowledge of self belay techniques.

Section 3 : Single Rope Technique

3.1 To be able to rig a pitch with regards to the requirements of section 1.

3.2 Protection

3.2.1 To correctly place and secure rope protectors.

3.2.2 To protect remaining rope from damage.

3.3 To be able to set up and negotiate secondary belays, rebelays and running belays.

3.4 To possess a wide knowledge of harnesses, descenders, ascenders and to be able to assess the safety of S.R.T. systems.

3.5 To be able to safely descend and ascend over rope protector knots and belays as in section 3.

3.6 To be conversant with the use of a cows tail.

3.7 To be able to change from ascending to descending a rope and vice versa.

Section 4 : Rescue

4.1 To be able to set up and operate a 2:1 and Z hauling system with the rope initially under tension.

4.2 To be able to abseil down with an injured person after having ascended or descended to them on the same rope.

Section 5 : Additional Requirements

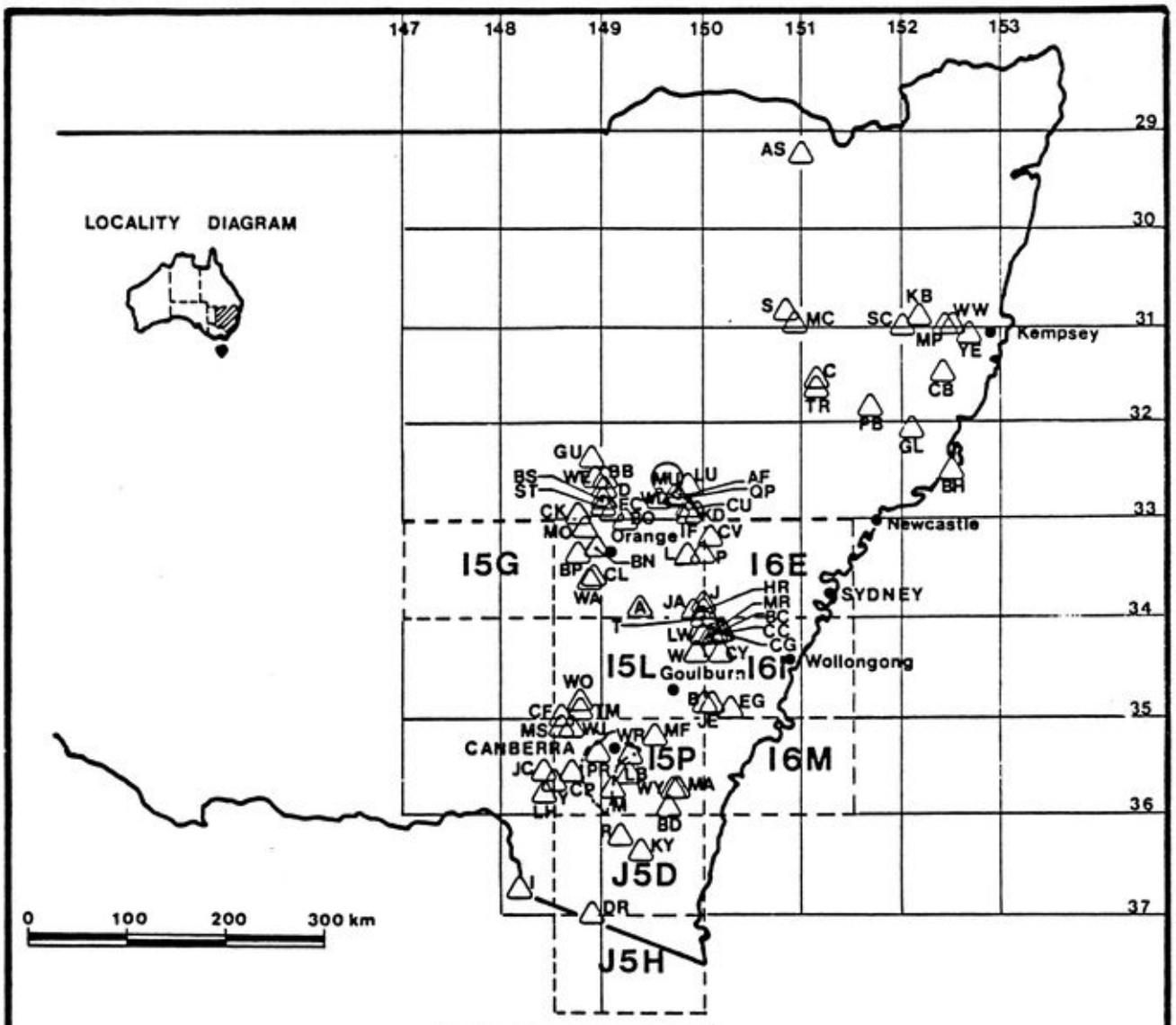
5.1 Trip leaders shall be expected to have attended appropriate SUSS field days.

5.2 Prospective trip leaders shall be examined in the conduct of a trip by at least two experienced trip leaders to be appointed by the Committee.

5.3 All trip leaders will be reassessed annually on a compulsory field day, the date of which is to be set by the Committee.

5.4 To have attended either a SUSS or C.R.G. cave rescue practise.

5.5 Trip leaders shall be expected to compile a report of each trip both for the SUSS archives and to be published in the Bulletin at the Editor's discretion. This task may be delegated to other trip members.



NSW and ACT

A	ABERCROMBIE	GU	GEURIE	MO	MOLONG
AF	APPLE TREE FLAT	HR	HOLLANDERS RIVER	MP	MOPARABAH
AS	ASHFORD	I	INDI	MR	MURRUIN CREEK
B	BUNGONIA	I5G	FORBES 1:250,000 Sheet	MS	MacPHERSON'S SWAMP CREEK
BB	BURRAN BURRAN	I5L	GOULBURN 1:250,000 Sheet	MU	MUDGEE
BC	BILLY'S CREEK	I5P	CANBERRA 1:250,000 Sheet	P	PORTLAND
BD	BENDITHERA	I6E	SYDNEY 1:250,000 Sheet	PB	PIGNA BARNEY
BH	BIBBY HARBOUR	I6I	WOLLONGONG 1:250,000 Sheet	PR	PADDY'S RIVER
BN	BORENORE	I6M	ULLADULLA 1:250,000 Sheet	QP	QUEEN'S PINCH
BO	BODULDURA	IF	ILFORD	R	ROSEBROOK
BP	BOWAN PARK	J	JENOLAN	S	SULCOR
BS	BAKER'S SWAMP	J5D	BEGA 1:250,000 Sheet	SC	STOCKYARD CREEK
C	CRAWNEY PASS	J5H	MALLACOOTA 1:250,000 Sheet	ST	STUART TOWN
CB	COMBOYNE	JA	JAUNTER	T	TUGLOW
CG	CHURCH CREEK	JC	JOUNAMA CREEK	TM	TAEMAS (incl NARRANGULLEN)
CF	CAVE FLAT	JE	JERRARA	TR	TIMOR (incl ISAACS CK, ISIS R, ALLSTON)
CG	COLONG (Lannigan's Creek)	KB	KUNDERANG BROOK	W	WOMBEYAN
CK	CUNNOCK	KD	KANDOS	WA	WALLI
CL	CLIEFDEN	KY	KYBEAN	WD	WINDEYER
CP	COOLEMAN PLAINS	L	LIMEKILNS	WE	WELLINGTON
CU	CUDGEGONG	LB	LONDON BRIDGE	WJ	WEE JASPER
CV	CAPERTEE VALLEY	LH	LOBS HOLE	WO	WARROO
CY	CANYONLEIGH	LU	LUE	WR	WHITE ROCKS
D	DRIPSTONE	LW	LITTLE WOMBEYAN CREEK	WW	WILLI WILLI
DR	DELEGATE RIVER	M	MICHELAGO	WY	WYANBENE
EG	ETTREMA GORGE	MA	MARBLE ARCH	Y	YARRANGOBILLY
FC	FINCHS CAVES	MC	MOORE CREEK	YE	YESSABAH
GL	GLOUCESTER	MF	MOUNT FAIRY		

P J Ackroyd · Nov 1985

CAVE AND KARST TERMINOLOGY

J. N. Jennings

First published in ASF Newsletter 83 (1979)
Replaces list in Speleo Handbook (1968)

This list of terms is substantially longer than that included in Speleo Handbook (1968). The increase reflects the greater depth and breadth of interest of Australian speleologists in caves and their surroundings. It remains a highly selective list of terms recommended for use in particular ways by Australians and it does not purport to gather comprehensively actual usage, good, bad and indifferent. For more complete collections of terms the following publications are the most useful:

W.H. Monroe 1970 A Glossary of Karst Terminology. U.S. Geological Survey Water Supply Paper 1899K.

H. Trimmel 1965 Speläologisches Fachwörterbuch. Third International Speleological Congress. Vol. C.

P. Fénelon 1968 Vocabulaire français des phénomènes karstiques. Mémoirs et Documents du Centre Documentaire Cartographique et Géographique, 4: 193-282.

C.A. Hill 1976 Cave Minerals. National Speleological Society, Huntsville.

English equivalents of foreign terms have been preferred except where the latter have long-established and agreed usage or where there is no precise counterpart in English. Amongst English words, simple Anglo-Saxon words are preferred to new inventions from Greek and Latin roots. Some terms which have markedly conflicting and confusing usages either within Australia or abroad or between Australia and abroad are omitted as the best deterrent to their further employment here. A very few terms not yet in common use have been introduced where these offer the opportunity of avoiding conflicting usages of other words which need to be retained despite this. A preliminary list was circulated to the ASF clubs and to a number of individuals for comment. The final list reflects very much suggestions from and discussions with the following:

E.G. ANDERSON, W.J. COUNSELL, J.R. DUNKLEY, JULIA M. JAMES, G.S. HUNT, D.C. LOWRY, P.G. MATTHEWS, N. MONTGOMERY, G.J. MIDDLETON, A. PAVEY, AOLA M. RICHARDS, T.M. WIGLEY, and the National University Caving Club.

It must not be thought, however, that these helpers agree with the composition of the list or with every definition. Nor in a sense do I since I have allowed my own opinion to be overruled in many cases, though I have dug my toes in over some. No selection will please everybody, still less the meanings given to those chosen, but to assemble all terms and usages would not only result in a volume to itself but might confuse more cavers than it would assist.

Abbreviations and conventions

Abb. = abbreviation
Syn. = synonym (word with same meaning)
Cf. = confer (compare) with the following term which is not identical but related to it.
n. = noun
v. = verb

A word in brackets in the left-hand column is commonly used in conjunction with the preceding word without altering the meaning.

A word in **bold** is defined elsewhere in this list.

Square brackets enclose statements not part of the definition but for special reasons included in the list.

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ABNEY LEVEL — A type of **clinometer** with a bubble tube used in cave survey to determine **vertical angles**.

ABSEIL (n.) — A controlled descent of a rope using friction obtained by (1) wrapping the rope around the body in a particular way or (2) passing the rope through a **karabiner** or (3) passing the rope through a **descender**.

ABSEIL (v.) — To do an **abseil**.

ACCIDENTAL (n.) — An animal accidentally living in a cave.

ACETYLENE — An inflammable hydrocarbon gas, C_2H_2, produced by water reacting with **calcium carbide**. When burnt, yields carbon dioxide as well as light.

ACTIVE CAVE — A cave which has a stream flowing in it. Cf. **live cave**.

ADAPTATION — An inherited characteristic of an organism in structure, function or behaviour which makes it better able to survive and reproduce in a particular environment. Lengthening of appendages, loss of pigment and modification of eyes are considered adaptations to the **dark zone** of caves.

AGGRESSIVE — Referring to water which is still capable of dissolving more **limestone**, other **karst** rock, or **speleothems**.

ANASTOMOSIS — A mesh of **tubes** or **half-tubes**.

ANCHOR — A fixed object used to secure a man whilst operating a safety rope or for attaching equipment such as **ladders** or ropes.

ARAGONITE — A less common crystalline form of calcium carbonate than **calcite**, denser and orthorhombic.

ARTEFACT — A product of human manufacture or art, e.g. tools of bone, stone, etc., paintings, engravings. In caves, tools are often buried in **sediment**. [Scientific attention should be drawn to the finding of artefacts in caves.]

ARTHROPODS — The most common group of animals inhabiting caves, including insects, crustaceans, spiders, millipedes, etc. They have jointed limbs and external skeletons.

ASCENDER — A mechanical device for ascending ropes.

ASSOCIATION — A relatively stable community of different species living in a characteristic habitat.

AZIMUTH — The true bearing of a survey line, determined by measurement from an accurate survey or by observations of sun or stars.

BARE KARST — **Karst** with much exposed bedrock.

BAT — A member of the order Chiroptera, the only mammals capable of true flight as they have membranes between the toes of their forefeet.

BATHYPHREATIC — Referring to water moving with some speed through downward looping **passages** in the **phreatic zone**.

BEARING — The angle measured clockwise that a line makes with the north line. True, magnetic and grid bearings are measured respectively from true, magnetic and grid north.

BED — A depositional layer of sedimentary bedrock or unconsolidated sediment.

BEDDING-GRIKE — A narrow, rectilinear slot in a karst rock outcrop due to solution along a bedding-plane.

BEDDING-PLANE — A surface separating two beds, usually planar.

BEDDING-PLANE CAVE — A cavity developed along a bedding-plane and elongate in cross-section as a result.

BELAY — (1) To attach to an anchor.
(2) To operate a safety line.

BIOSPELEOLOGY — The scientific study of organisms living in caves.

BLIND SHAFT — A vertical extension upwards from part of a cave but not reaching the surface; small in area in relation to its height.

BLIND VALLEY — A valley that is closed abruptly at its lower end by a cliff or slope facing up the valley. It may have a perennial or intermittent stream which sinks at its lower end or it may be a dry valley.

BLOWHOLE — (1) A hole to the surface in the roof of a sea cave through which waves force air and water.
(2) A hole in the ground through which air blows in and out strongly, sometimes audibly; common in the Nullarbor Plain.

BOLT — A high tensile steel bolt used as an anchor; either a conical bolt screwed into a metal holder in a hole drilled in rock, causing expansion for grip, or a bolt with partially filed thread hammered into a slightly smaller hole.

BONE BRECCIA — A breccia containing many bone fragments. [Scientific attention should be drawn to the finding of such in caves.]

BRAKE BAR — A round bar hinged to a karabiner or rappel rack used for abseiling.

BRANCHWORK — A dendritic system of underground streams or passages wherein branches join successively to form a major stream or passage.

BREAKDOWN — Fall of rock from roof or wall of a cave.

BRECCIA — Angular fragments of rock and/or fossils cemented together or with a matrix of finer sediment. Cf. bone breccia.

BRUNTON COMPASS — A type of compass, with a hinged mirror, which can be held in the hand or mounted on a tripod and which includes a clinometer. Designed also for measuring rock dip and strike.

CALCITE — The commonest calcium carbonate ($CaCO_3$) mineral and the main constituent of limestone, with different crystal forms in the rhombohedral subsystem.

CANOPY — A compound speleothem consisting of a flowstone cover of a bedrock projection and of a fringe of stalactites or shawls on the outer edge.

CANYON — (1) A deep valley with steep to vertical walls; in karst frequently formed by a river rising on impervious rocks outside the karst area.
(2) A deep, elongated cavity cut by running water in the roof or floor of a cave or forming a cave passage.

CARBIDE — Calcium carbide, CaC_2, used with water to make acetylene in lamps.

CAVE — A natural cavity in rock large enough to be entered by man. It may be water-filled. If it becomes full of ice or sediment and is impenetrable, the term applies but will need qualification.

CAVE BLISTER — An almost perfect hemisphere of egg-shell calcite.

CAVE BREATHING — (1) Movement of air in and out of a cave entrance at intervals. (2) The associated air currents within the cave.

CAVE CORAL — Very small speleothems consisting of short stalks with bulbous ends, usually occurring in numbers in patches.

CAVE EARTH — Clay, silt, fine sand and/or humus deposited in a cave.

CAVE ECOLOGY — The study of the interaction between cave organisms and their environment, e.g. energy input from surface, climatic influences.

CAVE FILL	Transported materials such as silt, clay, sand and gravel which cover the bedrock floor or partially or wholly block some part of a cave.
CAVE FLOWER	Syn. gypsum flower.
CAVE PEARL	A smooth, polished and rounded speleothem found in shallow hollows into which water drips. Internally has concentric layers around a nucleus.
CAVE POSTULE	A white, hemispherical wall and roof deposit of calcite.
CAVE SPRING	A natural flow of water from rock or sediment inside a cave.
CAVE SYSTEM	A collection of caves interconnected by enterable passages or linked hydrologically or a cave with an extensive complex of chambers and passages.
CAVERNICOLE	An animal which normally lives in caves for the whole or part of its life cycle.
CAVING	The entering and exploration of caves.
CAVERN	A very large chamber within a cave.
CENOTE	A partly water-filled, wall-sided doline.
CHAMBER	The largest order of cavity in a cave, with considerable width and length but not necessarily great height.
CHERT	A light grey to black or red rock, which fractures irregularly, composed of extremely fine crystalline silica and often occurring as nodules or layers in limestone.
CHIMNEY	A vertical or nearly vertical opening in a cave, narrow enough to be climbed by chimneying.
CHIMNEYING	Ascending or descending by means of opposed body and/or limb pressures against two facing walls.
CHOCK	A block of metal for use as a chockstone.
CHOCKSTONE	A rock wedged between two fixed rock surfaces.
CHOKE	Rock debris or cave fill blocking part of a cave.
CLAUSTROPHOBIA	An irrational fear of being in a closed space.
CLINOMETER	An instrument for measuring vertical angles or angles of dip.
CLOGGER	A type of ascender without a handle; used with a karabiner to keep it securely on the rope.
CLOSED TRAVERSE	A traverse which begins and ends at survey points with known co-ordinates and orientation or at the same point.
COCKPIT KARST	Conekarst in which the residual hills are chiefly hemispheroidal and the closed depressions often lobate.
COLUMN	A speleothem from floor to ceiling, formed by the growth of a stalactite and a stalagmite to join, or by the growth of either to meet bedrock.
COMPASS	An instrument with a magnetic needle which is free to point to magnetic north. For survey the needle is either attached to a graduated card or can be read against a graduated circle to measure the angle in degrees from the north clockwise.
CONEKARST	Karst, usually tropical, dominated by its projecting residual relief rather than by its closed depressions.
CONDUIT	An underground stream course completely filled with water and under hydrostatic pressure or a circular or elliptical passage inferred to have been such a stream course.
COPROLITE	Fossilized large excrement of animals, sometimes found in caves, especially those used as lairs.
COPROPHAGE	A scavenger which feeds on animal dung, including guano.
CORRASION	The wearing away of bedrock or loose sediment by mechanical action of moving agents, especially water.
CORROSION	Syn. solution.
COVERED KARST	Karst where the bedrock is mainly concealed by soil or superficial deposits.
CRAWL (WAY)	A passage which must be negotiated on hands and knees. Cf. flattener.
CROSS-SECTION	A section of a cave passage or a chamber across its width.

CRYPTOZOA The assemblage of small terrestrial animals found living in darkness beneath stones, logs, bark, etc. Potential colonizers of caves.

CRYSTAL POOL A cave pool generally with little or no overflow, containing well-formed crystals.

CURRENT MARKING Shallow asymmetrical hollows formed by solution by turbulent waterflow and distributed regularly over karst rock surfaces. Cf. **scallop.**

CURTAIN A **speleothem** in the form of a wavy or folded sheet hanging from the roof or wall of a cave, often translucent and resonant.

DARK ZONE The part of a cave which daylight does not reach.

DARK ADAPTATION A change in the retina of the eye sensitising it to dim light (the eye 'becomes accustomed to the dark'). Loss of sensitivity on re-exposure to brighter light is 'light adaptation'.

DAYLIGHT HOLE An opening to the surface in the roof of a cave.

DEAD CAVE A cave without streams or drips of water.

DECLINATION The angle from **true** (or **grid**) **north** to **magnetic north** for a given time and place.

DECOMPOSERS Living things, chiefly bacteria and fungi, that live by extracting energy from tissues of dead animals and plants.

DECORATION Cave features due to secondary mineral precipitation, usually of **calcite.** Syn. **speleothem.**

DESCENDER A mechanical device for descending ropes.

DEVELOPED SECTION The result of straightening out a **section** composed of several parts with differing directions into one common plane. Usually the plane is vertical and the length of the section equals the plan lengths of the **passages** and **chambers** comprising it.

DIG An excavation made (1) to discover or extend a cave or (2) to uncover **artefacts** or animal bones.

DIP The angle at which beds are inclined from the horizontal. The true dip is the maximum angle of the **bedding planes** at right angles to the **strike.** Lesser angles in other directions are apparent dips.

DOG-TOOTH SPAR A variety of **calcite** with acute-pointed crystals.

DOLINE A closed depression draining underground in **karst,** of simple but variable form, e.g. cylindrical, conical, bowl- or dish-shaped. From a few to many hundreds of metres in dimensions.

DOLINE KARST Karst dominated by closed depressions, chiefly **dolines,** perforating a simple surface.

DOLOMITE (1) A mineral consisting of the double carbonate of magnesium and calcium, $CaMg(CO_3)_2$. (2) A rock made chiefly of dolomite mineral.

DOMAIN A biological region of the earth's crust.

DOME A large hemispheroidal hollow in the roof of a cave, formed by the **breakdown** and/or **salt weathering,** generally in mechanically weak rocks, which prevents bedding and **joints** dominating the form.

DONGA In the Nullarbor Plain a shallow, closed depression, several metres deep and hundreds of metres across, with a flat clay-loam floor and very gentle slopes.

DRIPHOLE A hole formed by water dripping onto the cave floor.

DRIPLINE A line on the ground at a cave entrance formed by drips from the rock above. Useful in cave survey to define the beginning of the cave.

DRIPSTONE A deposit formed from drops falling from cave roofs or walls, usually of **calcite.**

DRY CAVE A cave without a running stream. Cf. **dead cave.**

DRY VALLEY A valley without a surface stream channel.

DUCK (-UNDER) A place where water is at or close to the cave roof for a short distance so that it can only be passed by submersion.

DUNE LIMESTONE Syn. **eolian calcarenite.**

DYE GAUGING Determining stream discharge by inserting a known quantity of dye and measuring its concentration after mixing.

DYNAMIC PHREAS A phreatic zone or part of a phreatic zone where water moves fast with turbulence under hydrostatic pressure.

EASTING (1) The distance of a point east of the point of origin of the grid of a map or some abbreviation of it. (2) The west-east component of a survey leg, or of a series of legs or of a complete traverse; east is positive and west is negative.

ECCENTRIC A speleothem of abnormal shape or attitude. Cf. helictite.

ENDOGEAN Pertaining to the domain immediately beneath the ground surface, i.e. in the soil or plant litter.

EOLIAN CALCARENITE A limestone formed on land by solution and redeposition of calcium carbonate in coastal dune sands containing a large proportion of calcareous sand from mollusc shells and other organic remains.

EPIGEAN Pertaining to the biological domain at the surface or above it.

EPIPHREATIC Referring to water moving with some speed in the top of the phreatic zone or in the zone liable to be temporarily in flood time part of the phreatic zone.

EROSION The wearing away of bedrock or sediment by mechanical and chemical actions of all moving agents such as rivers, wind and glaciers at the surface or in caves.

EXSURGENCE A spring fed only by percolation water.

FAULT A fracture separating two parts of a once continuous rock body with relative movement along the fault plane.

FAULT CAVE A cave developed along a fault or fault zone, either by movement of the fault or by preferential solution along it.

FAULT PLANE A plane along which movement of a fault has taken place.

FISSURE An open crack in rock or soil.

FISSURE CAVE A narrow, verical cave passage, often developed along a joint but not necessarily so. Usually due to solution but sometimes to tension.

FLATTENER A passage, which, though wide, is so low that movement is only possible in a prone position.

FLOE CALCITE Very thin flakes of calcite floating on the surface of a cave pool or previously formed in this way.

FLOWSTONE A deposit formed from thin films or trickles of water over floors or walls, usually of calcite. Cf. travertine.

FLUORESCEIN A reddish-yellow organic dye which gives a green fluorescence to water. Detectable in very dilute solutions so used in water tracing and dye gauging in the form of the salt, sodium fluorescein.

FLUOROMETER An instrument for measuring the fluorescence of water; used in water tracing and dye gauging.

FORESTRY COMPASS A lightweight, compact instrument to be mounted on a tripod, which functions as a compass and a clinometer, and has a telescopic sight. Some types facilitate measurement of horizontal angles as well as bearings.

FOSSIL The remains or traces of animals or plants preserved in rocks or sediments.

FREE PITCH Where a rope or ladder hangs vertically and free of the walls.

FREE-SURFACE STREAM A cave stream which does not normally fill its passage to the roof.

GARDENING Clearing stones or other loose material from a route, usually a pitch, which might otherwise be dangerous to a caver continuing.

GIBBS An ascender with its cam operated by the weight of the caver.

GLACIER CAVE A cave formed within or beneath a glacier.

GOUR Syn. rimstone dam.

GRADE The class of a cave survey on the basis of the precision of the instruments and the accuracy of the methods.

GRID A system of squares on a map formed by straight lines which represent progressive distances east and north of a fixed point of origin.

GRID NORTH The direction of a north-south grid line on a map. Except for the north-south grid line through the point of origin of the grid, it will differ slightly from true north.

GRIKE A deep, narrow, vertical or steeply inclined, rectilinear slot in a rock outcrop due to solution along a joint.

GROTTO A room in a cave of moderate dimensions but richly decorated.

GROUNDWATER Syn. phreatic water.

GUANO Large accumulations of dung, often partly mineralized, including rock fragments, animal skeletal material and products of reactions between excretions and rock. In caves, derived from bats and to a lesser extent from birds.

GUANOBIA An animal association feeding on guano. Not considered true cavernicoles as guano is not confined to caves.

GYPSUM The mineral hydrated calcium sulphate, $CaSO_4.2H_2O$.

GYPSUM FLOWER An elongated and curving deposit of gypsum on a cave surface.

HALF-BLIND VALLEY A blind valley which overflows its threshold when the stream sink cannot accept all the water at a time of flood.

HALF-TUBE A semi-cylindrical, elongate recess in a cave surface, often meandering or anastomosing.

HALITE The sodium chloride mineral, NaCl, in the cubic crystalline system.

HALL A lofty chamber considerably longer than it is wide.

HARNESS An arrangement of tape for attaching the lower body (seat harness) or the upper (chest harness) to ascenders or descenders.

HELICTITE A speleothem, which at one or more stages of its growth changes its axis from the vertical to give a curving or angular form.

HELMET A miner's, climber's or other kind of non-metallic, protective helmet used in caving.

HISTOPLASMOSIS A lung disease which may be caught from the guano of some caves, caused by a fungus, Histoplasmosis capsulatum. Usually mild in effect, it can be fatal in rare cases.

HORIZONTAL ANGLE The difference in direction of two survey lines measured clockwise in a horizontal plane.

HYDROSTATIC PRESSURE The pressure due to a column of water.

HYPOGEAN Pertaining to the domain below the endogean, including the dark zone of caves.

ICE CAVE A cave with perennial ice in it.

INFLOW CAVE A cave into which a stream enters or is known to have entered formerly but which cannot be followed downstream to the surface.

INTERSTITIAL MEDIUM Spaces between grains of sand or fine gravel filled with water which contains phreatobia.

INVERTED SIPHON A siphon of U-profile.

JOINT A planar or gently-curving crack separating two parts of once continuous rock without relative movement along its plane.

JOINT-PLANE CAVE A cavity developed along a joint and elongate in cross-section.

JUMAR An ascender with a simple finger-operated safety catch, a handle and several attachment points.

KANKAR (pronounced kunkar) A deposit, often nodular, of calcium carbonate formed in soils of semi-arid regions. Sometimes forms cave roofs.

KARABINER A steel or other alloy, oval- or D-shaped link with a spring-loaded gate on one side to admit a rope or to clip to a ladder, piton, etc.

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

KARST Terrain with special landforms and drainage characteristics due to greater solubility of certain rocks in natural waters than is common. Derived from the geographical name of part of Slovenia.

KARST WINDOW A closed depression, not a polje, which has a stream flowing across its bottom.

KERNMANTEL ROPE A rope with a plaited sheath around a core of parallel or twisted strands.

KEYHOLE (PASSAGE) A small passage or opening in a cave, which is round above and narrow below.

KRAB Colloquial abbreviation of karabiner.

LADDER In caving, a flexible, lightweight ladder of galvanized or stainless steel wires and aluminium alloy rungs.

LAKE In caving, a body of standing water in a cave, but used for what would be called a pond or pool on the surface.

LAVA-CAVE A cave in a lava flow; usually a tube or tunnel formed by flow of liquid lava through a solidified mass, or by roofing of an open channel of flowing lava. Small caves in lava also form as gas blisters.

LAY The way in which strands of a rope or cable are twisted.

LEAD A passage noticed but as yet unexplored.

LEAD-ACID CELL A rechargeable acid battery for use with an electric cap lamp.

LEADER In caving, the person directing the activities of a caving party, especially with regard to safety.

LEG A part of a survey traverse between two successive stations.

LEUCOPHOR A colourless water tracer, which fluoresces blue.

LIMESTONE A sedimentary rock consisting mainly of calcium carbonate, $CaCO_3$.

LINTEL LINE A line on the ground at a cave entrance perpendicularly beneath the outer edge of the rock above; may or may not coincide with the dripline.

LIQUID MEDIUM Contains the aquatic cavernicoles.

LIVE CAVE A cave containing a stream or active speleothems.

LONGITUDINAL (or LONG) SECTION A section along the length of a cave passage or chamber or combination of these, or along a survey traverse in a cave.

MAGNETIC NORTH The direction to the north magnetic pole at a given place and time. This differs from the direction towards which the north end of a compass points by a small individual compass error and by the effect of any local magnetic attraction.

MARBLE Limestone recrystallized and hardened by pressure and heat.

MAZE Syn. network.

MEANDER An arcuate curve in a river course due to a stream eroding sideways.

MEANDER NICHE A hemispherically-roofed part of a cave formed by a stream meandering and cutting down at the same time.

MICROCLIMATE The climate (i.e. temperature, humidity, air movements, etc.) of a restricted area or space, e.g. of a cave or on a lesser scale of the space beneath stones in a cave.

MICROGOUR Miniature rimstone dams with associated tiny pools of the order of 1cm wide and deep on flowstone.

MOONMILK Syn. Rockmilk. A soft, white plastic speleothem consisting of calcite, hydrocalcite, hydromagnesite or huntite.

MUD PENDULITE A pendulite with the knob coated in mud.

NATURAL ARCH An arch of rock formed by weathering.

NATURAL BRIDGE A bridge of rock spanning a ravine or valley and formed by erosive agents.

NECROPHAGE A scavenger feeding on animal carcasses (not prey).

NETWORK A complex pattern of repeatedly connecting passages in a cave.

NIFE CELL A rechargeable alkaline battery for use with an electric cap lamp.

NORTHING (1) The distance of a point north of the point of origin of the grid of a map, or some abbreviation of it.
(2) The south-north component of a survey leg, or of a series of legs, or of a complete traverse; north is positive and south is negative.

NOTHEPHREATIC Referring to water moving slowly in cavities in the phreatic zone.

NUMBERING Assigning an alphanumeric index to a cave entrance.

OPEN TRAVERSE A **traverse** which does not close onto a survey point of known co-ordinates and **orientation** or onto itself.

ORIENTATION The relationship of a survey line to **true**, **grid** or **magnetic north**.

OUTFLOW CAVE A cave from which a stream flows or formerly did so and which cannot be followed upstream to the surface.

PASSAGE A cavity which is much longer than it is wide or high and may join larger cavities.

PARIETAL(ASSOCIATION) Animals found on walls around cave entrances.

PENDANT Syn. **rock pendant**.

PENDULITE A kind of **stalactite** which has been partly submerged and the submerged part covered with **dog-tooth spar** to give the appearance of a drumstick.

PERCOLATION WATER Water moving mainly downwards through pores, cracks and tight fissures in the **vadose zone**.

PERMEABILITY The property of rock or soil permitting water to pass through it. Primary permeability depends on interconnecting pores between the grains of the material. Secondary permeability depends on solutional widening of **joints** and **bedding planes** and on other solution cavities in the rock.

PHREAS Syn. **phreatic zone**.

PHREATIC WATER Water below the level at which all voids in the rock are completely filled with water.

PHREATIC ZONE Zone where voids in the rock are completely filled with water.

PHREATOBIA An animal **association** found in water separating grains of sand or fine gravel.

PILLAR A bedrock column from roof to floor left by removal of surrounding rock.

PIPE A tubular cavity projecting as much as several metres down from the surface into **karst** rocks and often filled with earth, sand, gravel, **breccia**, etc.

PITCH A vertical or nearly vertical part of a cave for which **ladders** or ropes are normally used for descent or ascent.

PITON A solid or folded metal spike, of steel or other alloy, to be driven into a crack in the rock to form an **anchor**.

PLAN A plot of the shape and details of a cave projected vertically onto a horizontal plane at a reduced **scale**.

PLUNGE POOL A **swirlhole**, generally of large size, occurring at the foot of a waterfall or rapid, on the surface or underground.

POLJE A large closed depression draining underground, with a flat floor across which there may be an intermittent or perennial stream and which may be liable to flood and become a lake. The floor makes a sharp break with parts of surrounding slopes.

POLYGONAL KARST **Karst** completely pitted by closed depressions so that divides between them form a crudely polygonal network.

POOL DEPOSIT (1) Any **sediment** which accumulated in a pool in a cave. (2) Crystalline deposits precipitated in a cave pool, usually of crystalline shape as well as structure.

POPULATION Individuals of a species in a given locality which potentially form a single interbreeding group separated by physical barriers from other such populations (e.g. populations of the same species in two quite separate caves).

POROSITY The property of rock or soil of having small voids between the constituent particles. The voids may not interconnect.

POT (-HOLE) A vertical or nearly vertical **shaft** or **chimney** open to the surface.

PREDATOR An animal which captures other animals for its food.

PRISMATIC COMPASS A **compass** with a prism attached so that the compass card can be read at the same time as the compass is directed into the line of sight to a distance point.

PROJECTED SECTION The result of projecting a **section** composed of several parts with differing directions onto a single plane. Usually the plane is vertical along the general trend of the cave. The horizontal distance apart of points is not correct, only the vertical, so that slopes are distorted.

PRUSIK KNOT A friction knot which will slide along the rope when no weight is applied but grips when a pull is exerted on it. Used for ascending ropes.

PRUSIK SLING A **sling** fastened by a **prusik knot** to the rope.

PRUSIKING Ascent on a rope using **prusik knots** or **ascenders**.

PSEUDOKARST Terrain with landforms which resemble those of **karst** but which are not the product of karst processes.

RAPPEL Syn. **abseil**.

RAPPEL RACK A **descender** consisting of a frame mounting 5 or 6 **brake bars**.

RESURGENCE A **spring** where a stream, which has a course on the surface higher up, reappears at the surface.

RHODAMINE A red organic dye which gives a red fluorescence to water. Detectable in very dilute solutions so used in **water tracing** and dye **gauging**.

RIFT A long, narrow, high and straight cave **passage** controlled by planes of weakness in the rock. Cf. **fissure**.

RIMSTONE A deposit formed by precipitation from water flowing over the rim of a pool.

RIMSTONE DAM A ridge or rib of **rimstone**, often curved convexly downstream.

RIMSTONE POOL A pool held up by a **rimstone dam**.

RISING Syn. **spring**.

ROCK PENDANT A smooth-surfaced projection from the roof of a cave due to **solution**. Usually in groups.

ROCK SHELTER A cave with a more or less level floor reaching only a short way into a hillside or under a fallen block so that no part is beyond daylight.

ROCKHOLE A shallow, small hole in rock outcrops, often rounded in form and holding water after rains. Well known on the Nullarbor Plain.

ROCKPILE A heap of blocks in a cave, roughly conical or part-conical in shape.

ROOF CRUST Thin **speleothem** on cave precipitated from water films exuding from pores or cracks.

ROOM A wider part of a cave than a **passage** but not as large as a **chamber**.

ROPE PROTECTOR A length of heavy fabric or plastic hose placed around a rope where it may rub against rock.

SAFETY LINE A safety rope attached to a caver climbing on a **ladder** or negotiating a difficult situation and held by a man above.

SALT WEATHERING Detachment of particles of various sizes from a rock surface by the growth of crystals from salt solutions. Forms substantial features in Nullarbor Plain caves.

SAPROPHAGE A **scavenger** feeding on decaying organic material.

SATURATED (1) Referring to rock with water-filled voids.
(2) Referring to water which has dissolved as much **limestone** or other **karst** rock as it can under normal conditions.

SCALE The ratio of the length between any two points on a map, plan or **section** to the actual distance between the same points on the ground or in a cave.

SCALING POLES A lightweight metal alloy pole, in short sections for transport and fastened together where used, to raise a **ladder** to points inaccessible by climbing.

SCALLOPS **Current markings** that intersect to form points which are directed downstream.

SCAVENGER An animal that eats dead remains and wastes of other animals and plants (cf. **coprophage**, **necrophage**, **saprophage**).

SEA CAVE A cave in present-day or emerged sea cliffs, formed by wave attack or **solution.**

SECTION A plot of the shape and details of a cave in a particular intersecting plane, called the section plane, which is usually vertical.

SEDIMENT Material recently deposited by water, ice or wind, or precipitated from water.

SEEPAGE WATER Syn. **percolation water.**

SELENITE A crystalline form of **gypsum.**

SHAFT A vertical cavity roughly equal in horizontal dimensions but much deeper than broad. Wider than a **chimney.**

SHAWL A simple triangular shaped **curtain.**

SHOW CAVE A cave that has been made accessible to the public for guided visits.

SINGLE ROPE TECHNIQUE The practice of climbing up and down ropes with the help of **ascenders** and **descenders.** Abb. = SRT.

SIPHON A waterfilled **passage** of inverted U-profile which delivers a flow of water whenever the head of water upstream rises above the top of the inverted U.

SLING A joined loop of rope or **tape.**

SOLUTION In karst study, the change of bedrock from the solid state to the liquid state by combination with water. In physical solution the ions of the rock go directly into solution without transformation. In chemical solution acids take part, especially the weak acid formed by carbon dioxide (CO_2).

SOLUTION FLUTE A solution hollow running down the maximum slope of the rock, of uniform fingertip width and depth, with sharp ribs between it and its neighbours.

SOLUTION PAN A dish-shaped depression on flattish rock; its sides may overhang and carry **solution flutes.** Its bottom may have a cover of organic remains, silt, clay or rock fragments.

SOLUTION RUNNEL A solution hollow running down the maximum slope of the rock, larger than a **solution flute** and increasing in depth and width down its length. Thick ribs between neighbouring runnels may be sharp and carry solution flutes.

SPECIES A group of actually or potentially interbreeding populations which is reproductively isolated from other such groups by their biology, not simply by physical barriers.

SPELEOGEN A cave feature formed erosionally or by weathering in cave enlargement such as **current markings** or **rock pendants.**

SPELEOLOGY The exploration, description and scientific study of caves and related phenomena.

SPELEOTHEM A secondary mineral deposit formed in caves, most commonly **calcite.**

SPLASH CUP A shallow cavity in the top of a **stalagmite.**

SPONGEWORK A complex of irregular, inter-connecting cavities intricately perforating the rock. The cavities may range from a few centimetres to more than a metre across.

SPRING A natural flow of water from rock or soil onto the land surface or into a body of surface water.

SQUEEZE An opening in a cave only passable with effort because of its small dimensions. Cf. **flattener, crawl (way).**

STALACTITE A **speleothem** hanging downwards from a roof or wall, of cylindrical or conical form, usually with a central hollow tube.

STALAGMITE A **speleothem** projecting vertically upwards from a cave floor and formed by precipitation from drips.

STATION A survey point in a chain of such points in a **survey.**

STEEPHEAD A steep-sided valley in **karst,** generally short, ending abruptly upstream where a stream emerges or formerly did so.

STRAW (STALACTITE) A long, thin-walled tubular **stalactite** less than about 1cm in diameter.

STREAMSINK A point at which a surface stream disappears underground.

STRIKE The direction of a horizontal line in a **bedding plane** in rocks inclined from the horizontal. On level ground it is the direction of outcrop of inclined **beds**.

STYLOLITE Suture in rock formed where pressure solution has taken place, often leaving a thin lamina of insoluble material along it.

SUBJACENT KARST Karst developed in soluble beds underlying other rock formations; the surface may or may not be affected by the karst development.

SUMP A point in a cave **passage** when the water meets the roof.

SUPERSATURATED Referring to water that has more **limestone** or other **karst** rock in **solution** than the maximum corresponding to normal conditions.

SURVEY In caving, the measurement of directions and distances between survey points and of cave details from them, and the plotting of cave **plans** and **sections** from these measurements either graphically or after computation of co-ordinates.

SUUNTO CLINOMETER A small, handheld pendulum **clinometer** commonly used in cave **survey**.

SUUNTO COMPASS A small, handheld sighting **compass** commonly used in cave **survey**.

SWIRLHOLE A hole in rock in a streambed eroded by eddying water, with or without sand or pebble tools.

SYNGENETIC KARST **Karst** developed in **eolian calcarenite** when the development of **karst** features has taken place at the same time as the lithification of dune sand.

TAGGING Affixing a metal tag bearing a cave **number** near its entrance, normally by means of rock drill and a small nail.

TAFONI Roughly hemispherical hollows weathered in rock either at the surface or in caves.

TAPE (1) In survey, a graduated tape of steel, plastic, wire-reinforced cloth, or fibreglass, used for measuring distance. (2) Strips of woven synthetic fibre used for **slings** and waist bands.

TERRA ROSSA Reddish residual clay soil developed on **limestone**.

THRESHOLD (1) That part of a cave near the entrance where surface climatic conditions rapidly grade into cave climatic conditions. Not necessarily identical with **twilight zone**. (2) Slope or cliff facing up a **blind** or **half-blind valley** below a present or former **streamsink**.

THROUGH CAVE A cave which may be followed from entrance to exit along a stream course or along a passage which formerly carried a stream.

TOWERKARST **Conekarst** in which the residual hills have very steep to overhanging lower slopes. There my be alluvial plains between the towers and flat-floored depressions within them.

TRACE A short length of wire with fasteners used for attaching **ladders** and ropes to an **anchor**.

TRACER (1) A material introduced into surface or underground water where it disappears or into soil to determine drainage interconnections and travel time. (2) A material introduced into cave air to determine cave interconnections.

TRAVERSE (1) The commonest form of cave **survey** in which direction, distance and **vertical angle** between successive points are measured. (2) A way along ledges above the floor of a cave. (3) To move along such a way.

TRAVERTINE Compact calcium carbonate deposit, often banded, precipitated from **spring**, river or lake water. Cf. **tufa**.

TROGLOBITE A **cavernicole** unable to live outside the cave environment.

TROGLODYTE A human cave dweller.

TROGLOPHILE A **cavernicole** which frequently completes its life cycle in caves but is not confined to this habitat.

TROGLOXENE A **cavernicole** which spends only part of its life cycle in caves and returns periodically to the **epigean domain** for food.

TRUE NORTH The direction of the geographical north pole at a place.

TUBE A cave passage of smooth surface, and elliptical or nearly circular in cross-section.

TUFA Spongy or vesicular calcium carbonate deposited from spring, river or lake waters. Cf. travertine.

TUNNEL A nearly horizontal cave open at both ends, fairly straight and uniform in cross-section.

TWILIGHT ZONE The part of a cave to which daylight penetrates.

UVALA A complex closed depression with several lesser depressions within its rim.

VADOSE FLOW Water flowing in free-surface streams in caves.

VADOSE SEEPAGE Syn. percolation water.

VADOSE WATER Water in the vadose zone.

VADOSE ZONE The zone where voids in the rock are partly filled with air and through which water descends under gravity.

VAUCLUSIAN SPRING A spring rising up a deep, steeply-inclined, water-filled passage into a small surface pool.

VERMICULATION Pattern of thin, worm-shaped coatings of clay or silt on cave surfaces.

VERTICAL ANGLE The angle in a vertical plane between a line of sight and the horizontal, positive above the horizontal and negative below.

WATER TRACING Determination of water connection between points of stream disappearance or of soil water seepage and points of reappearance on the surface or underground.

WATERTABLE The surface between phreatic water which completely fills voids in the rock, and ground air, which partially fills higher voids.

WATERTRAP A place where a cave roof dips under water but lifts above it farther on. Cf. duck (-under).

WELL A deep rounded hole in a cave floor or on the surface in karst.

WET SUIT A diving garment of foam neoprene designed to insulate the diver from the cold but which allows a thin film of water to penetrate between the suit and the body.

WHALETAIL A descender consisting of an aluminium block with slots, knobs and a safety gate.

WINDOW An irregular opening through a thin rock wall in a cave.

CAVE SURVEY AND MAP STANDARDS

Edward G. Anderson & others

Reprinted from ASF Newsletter 79 (1978)
with entrance symbols of Jan. 1982 added.
Replaces ASF Survey Standard of 1962.

Table of Contents

1. INTRODUCTION

1.1 Design Context

The very concept of standardization raises a number of fundamental conflicts in both aims and application. Space will not permit a full discussion of these issues here, nor would it be appropriate, but they must be stated, so that the context within which the following standards were

designed is apparent and the areas of necessary compromise defined. Major areas of conflict may be enumerated thus:

1. Whether the map is regarded as: a club or personal record and/or working diagram, or an appendage or illustration in a publication.

2. Whether the map is intended for use in:
   1. General speleology.
   2. A specific scientific discipline.
   3. An engineering application.
   4. Tourist literature, educational or general publication.

3. Whether the advantages of uniformity gained by rigorous standardization outweigh the claims of professional judgement and personal skill, artistic freedom and originality.

4. The inherent differences between underground and surface surveying and mapping.

I.2
Scope of the Standards

These Standards are intended to provide the basis for sufficient uniformity to enable satisfactory comparisons of cave surveys and maps designed for general speleological purposes within Australia. Specific scientific, engineering, and social applications are considered beyond the jurisdiction of the Federation and are purposely excluded. If, however, the Standards evince a strong bias towards the requirements of publication of maps, rather than those of a localized record-keeping and documentation, then this is by definite intent. It is held that there exist numerous demonstrations of the foresight and practicality of a policy whereby the publication of cave maps is assumed from the outset, and all stages are designed with that goal in mind. There is little evidence to support the notion that such a policy detracts from the usefulness of such maps in any aspect of general speleology.

An emphasis has been placed on cave mapping in contrast to surface mapping as the latter is rightly the domain of the topographic geographer, however some basic information has been given for cavers preparing surface maps.

2.
UNITS

The International System (SI) Units should be used for all surveys and maps. Surveys already completed in Imperial units should be converted for publication, or additional metric scales and information should be included. Future surveys conducted using Imperial equipment should be converted before computation and plotting.

Usage should conform with the current Australian Standard (AS 1000 - 1970 **The International System (SI) Units and their Application**). The relevant sections of this standard are as follows:

1. Length:

millimetre	mm
metre	m
kilometre	km

2. Area:

square metre	m^2
hectare	ha_2 (=10 000m^2)
square kilometre	km^2

3. Volume:

cubic metre	m^3

4. Volume Flow:

litre/second	L/s
cubic metre/second	cu m/s

5. Temperature:

degree Celsius	^oC

6. Plane Angle:

degree	o
minute	'
second	"

NOTES:

1. The correct length conversion factor is: 1 foot = 0.3048 metre (exactly).

2. The plural form of all units and their abbreviations is the same as the singular. Do not add "s" to abbreviations as this stands for "seconds" of time. Litre abbreviation "L" is approved alternative to script "ℓ".

3. SCALES

All map scales should be multiples of powers of ten of the following ratios:

1:1 1:2 1:5

The following scales are recommended:

1:100	1:200	-	1:500
1:1000	1:2000	-	1:5000
1:10 000	-	1:25 000 (Note 2)	1:50 000
1:100 000	-	-	-

1:200 is preferred for all cave mapping and should be regarded as the **common standard scale.**

1:100 should not generally be used (particularly when the sole aim is to fill the page with a small cave), and is included only for applications with a specific need for such a scale.

It is recognised that the scale ratios 1:1.25 1:2.5 1:4 and 1:8 may arise from the convenience of photo-reduction or enlargement. However, they should be avoided in all original cave map drafting.

NOTES:

1. The use of a series of adjoining sectional maps (the so-called street-directory method) to facilitate presentation of extensive caves at a large scale is strongly recommended. In such cases, the common scale of 1:200 should be used for sectional maps which should be

prepared on A4 sheets. One or more key maps at a suitable smaller scale should be used to index the sectional maps.

2. Australian Standard AS 1100.7 recommends the scale 1:25 000, but not 1:20 000.

4.
MAPPING SHEET SIZES

Metric paper sizes are recommended as follows:

A4	(210 x 297mm)
A3	(297 x 420mm)
A2	(420 x 594mm)

A4 is preferred for all published maps and should be regarded as the **common standard sheet size.**

In all cases a minimum clear margin of at least 5mm should surround the map. For applications involving filing, or "folding in", a filing strip of at least 20mm should be retained.

NOTE:
Suitable sizes and layouts are fully defined in the relevant Australian Standards: **AS 1100.3 Sizes of Drawing Sheets**, and **AS 1100.4 Layout of Drawing Sheets.**

5.
SURVEY AND MAP RECORDS

To ensure their future availability, all original readings, sketches, and calculated data should be filed in a recognized location, such as in the records of the society holding the map original.

To facilitate uniformity of map sheets and associated survey and field records, it is recommended that forms approved by the Federation be used for these purposes. Standard designs for the following forms may be approved by the Federation from time to time:

1. Survey Field Record Form
   A generalized form for recording survey observations.

2. Survey Abstract Form
   A generalized form for recording an abstract of survey results. (Not a computation form.)

3. Field Mapping Sheet
   A generalized sheet for field mapping, with a grid and provision for entry of all required information.

4. Map Sheet
   A set of generalized sheets for final drafting, conforming to size and layout requirements, and with provision for entry of all required information.

NOTES:
The use of standardized forms is the best way of ensuring that all necessary information has been recorded. This is a significant advantage in the field, when reference to the appropriate standards may not be possible and the problems of the survey demand full attention.

6.

SURVEY DATUMS

Every effort should be made to connect area and cave surveys to a standard datum and to compute survey results with respect to such a datum. Preferably the national datum, called the **Australian Geodetic Datum** (AGD), should be used, or alternatively one the of State datums. Complete connection requires that horizontal co-ordinates, height and orientation are all defined in terms of the datum. Thus, in the case of national or State datums the following information is essential:

1. Horizontal co-ordinates
   - either 1. Projection co-ordinates:
     1. Australian Map Grid (AMG) co-ordinates.
     2. Transverse Mercator (TM) co-ordinates, in some States.
     3. Integrated Survey Grid (ISG) co-ordinates in NSW.
   - or 2. Geographical co-ordinates, i.e. latitude and longitude.

2. Height
   - either 1. Height with respect to the Australian Height Datum (AHD).
   - or 2. Height with respect to a State "standard" datum.

3. Orientation
   - either 1. In terms of grid azimuth.
   - or 2. In terms of true azimuth.

If it is not practical to connect to a standard datum, provision should be made for connection at a later date by adopting one or more local datums. Preferably, only one datum should be adopted in each area, and all surveys in the vicinity integrated. However, failing this, as an absolute minimum each survey should have a fully defined and physically recoverable datum.

The definition of a local datum requires two distinct components:

1. One, but preferably more, permanent marks defining physically recoverable points, with adequate nearby reference marks to ensure recoverability of position in case of loss or damage of the main mark.

2. A set of co-ordinates and azimuths defining the relationship between the adopted co-ordinate system and the permanent marks. The minimum information necessary to define this relationship comprises:
   1. Horizontal co-ordinates and height of at least one permanent mark (probably in a plane co-ordinate system).
   2. The orientation of the co-ordinate system (i.e. grid) with respect to true north, or at least magnetic north at a known date.

Use of the Australian Map Grid should be considered standard practice, and exceptions - such as avoidance of publication of cave locations - treated as a special case. For instance the AMG should be used for caves which are reasonably protected by means of reserves or similar entry restrictions. In cases where publication with the grid is considered unwise, a grid referred to a local datum with arbitrary co-ordinates may be employed, and a note appended informing users where details relating the local and standard datums can be obtained. In many cases, adequate protection is afforded by merely suppressing the high order digits of the standard co-ordinates.

NOTES:

1. Survey results which are not related to a physically recoverable datum in the field are almost worthless. By the simple process of adopting and permanently marking a datum within the survey its usefulness is preserved. Connection to a local or standard datum can be established in the future and the survey integrated with other work.

2. Connection of a survey to a datum requires observations to relate both position (horizontal co-ordinates) and orientation (a bearing or azimuth).

3. The most convenient method of physically defining orientation is to adopt and mark at least two intervisible points, with as much separation as can be practically achieved. Orientation is then expressed as the bearing or azimuth between these points.

7. MAP GRIDS

Grid lines should be shown at an appropriate interval on the face of the map. In some circumstances it may be necessary to show only grid return lines at the map border.

Grid lines should be the lightest lines on the map. Identification figures should be in the margins, but may in some instances appear on the face of the map.

7.1 Grid Intervals

The grid interval, at equivalent ground distance, should be related to the scale of the map as follows:

SCALE	GRID INTERVAL Ground distance (m)
1:100	2
1:200	5
1:500	10

Multiples of powers of ten of these intervals should be used for smaller scales, e.g. 1:1000, 20m.

8. SYMBOLS

A basic set of standard symbols for general speleological mapping is illustrated in Table 1. The symbols in the first column are intended for use in plan views. The second column contains the equivalent symbol for use in vertical sections or views, when this differs from the plan symbol.

These symbols are intended for use at relatively large scales (such as the standard scale, 1:200) and it is recognised that some modifications may be necessary to accommodate the requirements of very small scales. However, detailed maps are unlikely to be required at such scales.

It is recommended that symbols for surface mapping be in accordance with the current edition of Topographic Map Symbols, Division of National Mapping, Australia.

If a more extensive set of symbols is required for a specific mapping project, the following criteria should be observed:

1. The symbol should as far as possible bear a recognisable relationship with the actual feature it represents.

2. Symbols representing features which may be logically classified within a group should likewise bear a common relationship to each other and, if appropriate, to one of the basic standard symbols.

3. Standard symbols should not be redefined with a different meaning.

4. As far as possible, symbols commonly used with a well established meaning in other disciplines should not be employed for a totally different purpose.

5. A brief note or phrase may obviate the need for a new or complex symbol.

NOTES

1. Because of possible confusion with other symbols, the use of shading in association with outlines should be avoided.

2. Various line thicknesses can be usefully applied to distinguish between outlines, detail symbols, and special lines such as grid and section lines.

3. Confusion between plan symbols at different cave levels and between roof and floor details should be avoided by using separate detail plans, with accompanying outline diagrams to define the correct vertical relationships.

4. The capital letters "R", "W", or "F" may be appended generally to other symbols to indicate location on roof, wall, or floor respectively, and they should be reserved solely for this purpose.

5. The design and use of symbols is well documented in **Elements of Cartography**, Arthur H. Robinson, 2nd ed., 1963, John Wiley & Sons, Inc, which is also a useful reference for all general cartographic information.

6. The symbols for dip, strike, change of rock-type, doline, fence, etc. have been included only for convenience as they have already been laid down elsewhere.

7. Similarly, some electrical symbols have been shown for convenience. All electrical symbols used should conform to **AS 1102.8 Location Symbols - Power Supply Systems and Electrical Services for Buildings and Sites.**

9. SURVEY AND MAP DETAIL GRADES

9.1 Survey Grades

Recommended grades are listed in Table 2.1. The grade number, ranging from 0 to 9, appears in Column 1. Grades are assessed primarily on the basis of the instruments and methods employed, as defined in the second column. This definition is further qualified by the degree of observational

precision adopted in using the instruments. Required precisions of angular and linear readings are set out in Columns 3 and 4 respectively. In most instances these values may be taken to mean simply the degree of fineness of each individual reading, e.g. if a compass is read to the nearest whole degree, the observation precision is assumed to be 1^{o} - but see also Notes 1 to 3. Centring errors, which may be a most significant source of error, are assumed to be kept within the requirements for linear precision. Expected accuracies, in Column 5, are intended only as a rough indication of the overall accuracy of the whole survey (See Note 4).

To indicate that magnetic anomalies have been checked and corrected for in magnetic surveys (e.g. by reading foresight and backsight bearings for each line), and that the effects of these and other systematic errors have been removed, the letter "C" (for checked/corrected) should be suffixed to the grade number.

To indicate that "gross" errors (mistakes) have been detected by closing the survey, and have been removed, and that the effect of the remaining "accidental" errors has been minimized by adjusting the survey, the letter "A" (for adjusted) should be suffixed to the grade number (See also Notes 5 and 6).

If electromagnetically determined survey stations have been used to improve the accuracy of a cave map, then the letter "E" should be suffixed to the grade number.

9.2
Map Detail Grades

Recommended grades, ranging from 0 to 5, are listed in Table 2.2. The grade is assessed on the method used to compile the detail information and the type of information included in the map as defined in the table (See also Note 9).

9.3
Format of Grade Number

These grades should be referred to as the **Australian Speleological Federation Survey and Map Grade**, abbreviation **ASF Grade** (See Note 10).

The grade should be expressed as a two digit number, the first digit representing the survey grade and the second digit representing the map detail grade. Qualifying letters should be appended as required.

Usage of the total grade designation should conform with the format illustrated by the following examples:

1. ASF Grade 64
2. ASF Grade 53C
3. ASF Grade 84AC
4. ASF Grade 42ACE
5. ASF Grade 02 (See Note 8)

NOTES

1. A deliberate distinction exists between the meaning of the terms "precision" and "accuracy", which may be illustrated by the following:

   Three angles of a plane triangle are measured by two parties, A and B, and the results, for the sum of the angles, are thus:

A 180^{o} 01' 40"
B 180^{o} 01'

If A observed the angles to the nearest 20", while B made readings to the nearest whole minute, then A is more "precise" than B, but, since the correct sum of the angles should be exactly 180^{o}, B is more "accurate" than A.

Note that accuracy can only be assessed in relation to some standard (known or adopted), whereas precision is determined by the quality of instruments and methods employed.

2. The observation precision quoted for the higher grades (7 to 9) may not be simply the precision of a single reading. In such work it is common practice to improve the precision of the results by repeating observations. The final precision is then determined by a statistical analysis of the readings.

3. In arriving at a relationship between angular and linear precision, a reasonable balance has been assumed to be desirable. The values given for grades up to 7 would be approximately balanced for relatively short survey lines (of the order of 5m) such as might be expected in cave surveys. However, this does not hold for Grades 8 and 9, where better quality angle measuring instruments are used, and linear precision tends to become the limiting factor.

4. In deriving the expected accuracies, a tendency towards pessimism was adopted, mainly to allow for the poor observing conditions encountered in most cave surveys, and the common necessity for short survey lines.

5. Errors are of three basic types:

Gross errors (mistakes): Elimination involves remeasurement.

Systematic errors: Repeatable errors caused by known physical laws and which can therefore be calculated and removed. They include local magnetic anomalies and instrument maladjustments.

Accidental errors: Unpredictable errors, such as the unavoidable inaccuracy in reading the instruments. When mistakes and systematic errors have been removed, accidental errors remain; their effect can then be minimized by adjustment.

6. Adjustment of the survey may be achieved by either closing the survey on itself (as in a loop traverse), or better still, by closing it between survey stations whose positions are known to a higher accuracy. Such a closure may be obtained using electromagnetic position fixing apparatus (Radio Direction Finding).

7. Cave surveys may be classified as either "premeditated" or "unpremeditated", where the former is intended to mean that some degree of preparation preceded the execution of the survey. The dividing line falls between Grades 4 and 5, so that Grade 4 is probably the highest grade that could normally be achieved without deliberate preparation. Conversely, Grade 5 should be considered the lowest grade to be attempted when purposely organising a cave survey.

8. Grade 0 (zero) should be used to indicate that the grade of the survey or map is unknown.

9. In recording cave detail, advantage is gained by sketching the detail around a plot of the traverse at the final scale while the survey is actually proceeding, namely:

1. Improved accuracy of sketched details.
2. Early detection of gross traverse errors while there is still an opportunity to correct them.
3. A working map of the cave is available immediately it is surveyed.
4. The details are more easily traced on to the final map because the scale is the same.

10. The ASF grades have been designed to be compatible with the old Cave Research Group of Great Britain (CRG) grades, now British Cave Research Association (BCRA) grades, within the limits of the latter systems. However, it is specifically recommended that conversion of existing CRG or BCRA grade allocations to the ASF system be not undertaken.

10.
CAVE MAPPING TERMINOLOGY

To avoid ambiguity, use of the following technical terms on maps should conform with the accompanying definition:

1. Plan
A representation of the details to be mapped resulting from parallel projection on to a horizontal plane.

2. Elevation
A representation of the details to be mapped resulting from parallel projection on to a vertical plane.

3. Section (generally)
The trace or outline of the details to be mapped representing their intersection with a chosen section plane.

4. Cross (or Transverse) Section
A vertical section which is substantially perpendicular to the general direction of the greatest dimension of that part of the cave in the near vicinity of the section plane.

5. Longitudinal Section
A vertical section which substantially coincides with the general direction of the greatest dimension of that part of the cave in the near vicinity of the section plane.

6. Developed
A qualifying term used to indicate that a particular section comprises several contiguous, but non-parallel, section planes, which have been artificially rotated into a common plane. The technique is commonly applied to longitudinal sections.

7. Horizontal Section
A section where the section plane is horizontal. This technique may be usefully applied when the cave development is predominantly vertical.

NOTE:
It is important to the correct interpretation of cave maps that both the draftsman and the user understand the distinction between projections and sections, e.g. that an **elevation** is a **projection** of the **maximum dimensions** on to a plane behind a cave passage, whereas a **longitudinal section** shows where the passage **intersects** the particular section plane, which may or may not be at the maximum dimension. Similarly with plans and horizontal sections - a plan shows the projection of all the maximum passage widths on to a plane below the cave, but a horizontal section shows only that part of the cave which intersects the section plane, i.e. only at one particular level. The cave draftsman should therefore take care both to label the various views on his map and to use the terminology appropriate to his method.

11.
INFORMATION REQUIRED ON MAPS

The following information is considered necessary on every map:

11.1
Identification

1. Cave name and number, area name or locality.
2. ASF map number, and sheet number if appropriate.
3. Location diagram or description, and/or superimposed grid (refer end of Section 6 re location suppression).

11.2
Survey Details

1. Details and physical description of the horizontal and vertical datums adopted, including the geographical and Australian Map Grid (or other standard) co-ordinates if known, or the local co-ordinates if arbitrarily adopted.
2. Details of any associated control surveys, including the method of connecting to the datum and determining the orientation.
3. Details of the grid employed, including its relationship to the datum (such as the use of a false origin), its orientation with respect to true and/or magnetic north, and the grid interval. Orientation is best depicted diagrammatically, and such a diagram, indicating the direction of true and/or magnetic north, is essential if there is no grid.
4. ASF Survey and Map Grades. Details of instruments and methods employed. Accuracies and closure errors if known, and details of any peculiar survey difficulties.
5. Names of surveyors and dates of surveys.

11.3
Map Details

1. Scale:
    1. A statement of the original scale as a representative fraction in the form map distance to ground distance, e.g. Scale of Original - 1:200.
    2. A graphic scale bar comprising a coarse and fine section. The coarse section should be of sufficient length to facilitate physical scaling of distances from the map. The fine section should be at least as long as one coarse division and should be subdivided to a level consistent with the general accuracy of the map. The zero of the scale should be located between the fine and coarse sections. Use of a scale bar enables correct scaling even after photo reduction or enlargement.
    3. A statement of the original sheet size, e.g. A4.

2. Table of symbols, illustrating all symbols used.

3. Units:
   1. A statement of the units for any quantities used, e.g. dimensions, temperatures, etc.
   2. The contour interval if appropriate.

4. Relationship to adjoining or index sheets if appropriate.

5. Compilation details, including source of material, names of draftsmen, and dates of compilation and drafting. A revision number if necessary.

6. Name and address of map publisher.

TABLE 1 MAP SYMBOLS

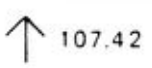
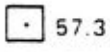
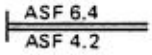
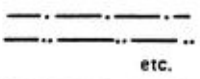
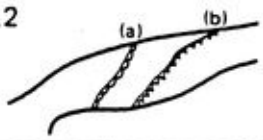
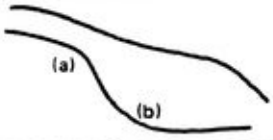
1. SURVEY STATIONS		
1.1 		Horizontal datum point. (Permanently marked control station with fixed coordinates.)
1.2 		Vertical datum point with altitude.
1.3 		Combined horizontal and vertical datum point.
1.4 		Permanently marked survey station.
1.5 		Unmarked (but relocatable) survey station. (Referenced in survey abstract.)
1.6 		Unmarked natural feature used as survey station. (Described in survey abstract.)
2. SPECIAL LINES		
2.1 		Section line showing direction of view and reference letter.
2.2 		Change of survey grade.
3. OUTLINES		
3.1 		Outline. (Various thicknesses may be used for different sections, or levels.) The outline should be heavier than all other lines.
3.2 		Conjectural outline.
3.3 		Outlines at significantly different levels or displaced from section plane.
4. CHANGES OF LEVEL OR SLOPE		
4.1 		Vertical change of floor level (cliff or pit), with height. *Symbol on lower side.*
4.2 		Change in slope of floor, (a) convex, (b) concave. *Symbol on lower side.*
4.3 		Entrance or pit (doline) at surface. Side sloping to passage.

TABLE 1 MAP SYMBOLS (CONT)

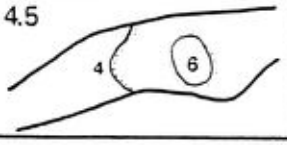
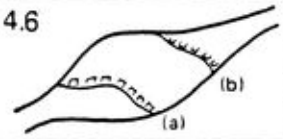
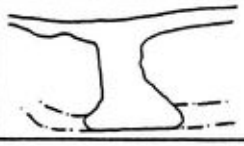
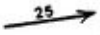
4.4 		Entrance or pit (doline) at surface. Vertical or near vertical walls
4.5 		Vertical change of roof level, (step or blind shaft), with height. *Dots on lower side*
4.6 		Change in slope of roof, (a) concave, (b) convex. *Symbols free of line and drawn on lower side.*
4.7 		Combination of 4.1 and 4.5 to indicate connecting shaft. *Most vertical relationships may be depicted by means of such combinations.*
4.8 		Direction of downward slope of floor with gradient in degrees.
4.9 		Direction of downward slope of roof with gradient in degrees.
4.10 		Height from floor to roof.
4.11 		Depth of water.
5. MATERIALS		
5.1 		Large rocks, boulders.
5.2 		Rockfall, talus.
5.3 		Pebbles, gravel.
5.4 		Sand.
5.5 		Earth, mud.
5.6 		Roots (in situ).
5.7 		Guano.
5.8 		Vegetable debris.
6. SECONDARY DEPOSITS		
6.1 		Rimstone pools, gours, terraces, with water.

TABLE 1 MAP SYMBOLS (CONT)

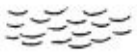
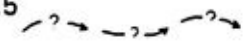
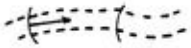
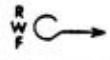
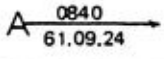
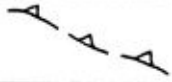
6.2			Rimstone dams, dry.
6.3			Flowstone.
6.4			Stalagmite.
6.5			Stalactite.
6.6			Column, (not bedrock).
6.7			Crystals.
6.8			Helictites.
6.9			Moonmilk.
7. PHYSICS			
7.1			Flowing water, with direction and volume flow (l/s or cu m/s).
7.2			Standing water, (pool or lake). *Shading lines horizontal regardless of orientation of cave.*
7.3			Water without free surface to air. *Additional shading lines vertical regardless of orientation of cave.*
7.4			Intermittent water course.
7.5			Conjectural water course.
7.6			Roof canyon: ⟵ Direction known. (Direction unknown.
7.7			Current scallops, (R) roof, (W) wall, (F) floor.
7.8			Direction of air flow, with time and date *(year, month, day).*
7.9			Limit of daylight.
7.10 			Change in rock type.

TABLE 1 MAP SYMBOLS (CONT)

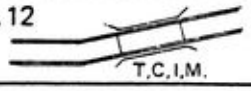
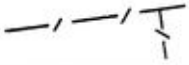
8. ARTIFICIAL CONSTRUCTIONS (e.g. Tourist Caves)		
8.1 		Hand rail.
8.2 		Fence.
8.3 		Formed path, with steps.
8.4 		Permanent ladder.
8.5 		Fixed line.
8.6 		Door. (L) locked. (U) unlocked.
8.7 		Gate. (L) locked. (U) unlocked.
8.8 		Electric light.
8.9 		Power outlet.
8.10 		Electric light switch.
8.11 		Emergency light, (torch, candles).
8.12 		Bridge: (T) timber, (C) concrete, (I) iron, (M) masonry.
8.13 		Artificial embankment. *Symbols on lower side.*
9. SURFACE FEATURES		
9.1 		Doline (degraded): *Note wider spacing than 4.4.*
9.2 		Doline: with cliff or partial cliff.
9.3 		Cliff line.
9.4 		Fence.
9.5 		Gate.
9.6 		Karst field.

TABLE 1 MAP SYMBOLS (CONT)

10. ENTRANCES (1)

Entrance Types		ACTIVE											DRY		
		Outflow				Inflow				Out↔In (Estavelle)					
		Perennial	Intermittent			Perennial	Intermittent			Intermittent					
				Connects to				Connects to			Connects to			Connects to	
				Perenn. flow	Interm. flow			Perenn. flow	Interm. flow		Perenn. flow	Interm. flow		Perenn. flow	Interm. flow
Penetrable	Cave														
	Pot-hole														
Impenetrable													(not determined)		

11. ENTRANCES (2)

		Rockshelter.
		Natural bridge -over perennial stream.
		Natural bridge -over intermittent stream.
		Artificial cavity -cave type.
		Artificial cavity -pothole type.
		Destruction of cave entrance -partial.
		Destruction of cave entrance -complete.

The above entrance symbols were adopted in Jan 1982 and correspond with those in Speleological Conventional Signs (UIS 1978).

TABLE 2.1 SURVEY GRADES

GRADE	TYPICAL INSTRUMENTS AND METHOD	OBSERVATION PRECISION		EXPECTED ACCURACY	COMMENTS
		ANG.	LIN.		
0	Ungraded	-	-	-	-
1	Sketch or diagram from memory. Not to scale.	-	-	-	-
2	Map compiled from notes, sketches and estimates of directions and distances made in the cave. No instruments used.	-	-	-	If Grade 3 un-attainable
3	Significant directions measured by compass. Distances measured by cord (e.g. waistloop, safety line, ladder) of known length, or by careful pacing or body dimensions. Significant slopes estimated.	5°	0.5m	10%	Preferred grade for quick surveys
4	Compass and tape traverse, using deliberately chosen survey stations (not necessarily permanently marked, but preferably indicated by natural or artificial marker). Distances by tape, marked cord, or rangefinder. Slopes measured by simple clinometer or horizontal and vertical components of line measured.	2°	0.1m	5%	If Grade 5 un-attainable
5	Compass and tape traverse. Directions by calibrated compass (e.g. liquid-damped prismatic or semi-supported Brunton). Vertical angles by calibrated Abney level or similar clinometer. Distances by metallic or fibreglass tape, or tacheometry.	1°	5 cm	2%	The preferred minimum grade. Highest possible grade if magnetic-ally un-checked.
6	Traverse and/or triangulation using calibrated, tripod-mounted instruments for directions and vertical angles (e.g. forestry compass). Distances by calibrated tape or precise tacheometry, or subtense.	15'	2 cm	1%	-
7	Controlled traverse and/or triangulation using small theodolite (e.g. Wild T12 or T0, adjusted forestry compass with vernier) for directions and vertical angles. Distances by calibrated steel or fibreglass tape.	5'	1 cm	1/1000	-

TABLE 2.1 SURVEY GRADES (CONT)

GRADE	TYPICAL INSTRUMENTS AND METHOD	OBSERVATION PRECISION		EXPECTED ACCURACY	COMMENTS
		ANG.	LIN.		
8	Conventional theodolite traverse and/or triangulation conforming with requirements for acceptable cadastral survey accuracy. Directions and vertical angles by glass arc theodolite (e.g. Wild T1). Distances by standardised steel tape or band or electronic distance meter (EDM). All normal precautions for the elimination of systematic errors should be taken. Levels may be made by differential levelling.	20"	5 mm	1/5000	-
9	Precise control traverse and/or triangulation and/or trilateration. Directions and vertical angles by "one-second" theodolite (e.g. Wild T2) with constrained centering. Distances by standardised steel or invar tape or band or EDM. Levels preferably by differential levelling.	1"	0.5mm	1/25 000	-

TABLE 2.2 MAP DETAIL GRADES

GRADE	METHOD
0	Ungraded.
1	Sketch from memory. Not to scale but indicating approximate proportions.
2	Map compiled from notes, sketches and estimates of directions and dimensions made in the cave.
3	Map compiled from drawings made in the cave, based on approximate measurements of major details. Lesser details added by sketching and estimation.
4	Map compiled from drawings made in the cave, based on measurements of significant details with respect to surveyed points (usually at least Grade 4). All details of general speleological interest should be shown with sufficient accuracy so as not to be appreciably in error at the mapping scale.
5	As for Detail Grade 4, with the addition of significant morphological features and details of primary and secondary deposits.

TABLE 2.3 QUALIFYING SUFFIXES

SUFFIX	METHOD
A	Suffix the letter "A" if the survey is closed and adjusted.
C	Suffix the letter "C" if the survey is dependent upon magnetic bearings which *have* been checked and corrected for the effects of possible magnetic anomalies.
E	Suffix the letter "E" if the survey has been checked and corrected by electromagnetic methods.

ASF CODE OF ETHICS

The Federation expects that the following code will guide the actions of members of ASF societies.

1. (a) They will, in reporting their work, avoid and discourage sensationalism, exaggeration and unwarranted statements
   (b) They will, in publishing their work, take particular care to acknowledge other people's contributions to the work involved, either as clubs or individuals, published work, personal communication or whatever.
   (c) They will be discreet in disseminating information that might endanger caves. In particular, they should not broadcast their knowledge of entrance locations or routes.
2. (a) They will treat guides and other officials of tourist caves courteously and respectfully.
   (b) They will endeavour to be courteous to the general public, but will defend caves from attentions of the uninstructed where this is deemed necessary for the protection of the cave.
3. (a) They will carefully observe the established rules of good camping conduct, especially in the removal and disposal of rubbish.
   (b) They will bury their faeces when camping in bush conditions but should avoid the catchment areas of caves.
   (c) They will not camp in any cave.
4. (a) They will have specific or tacit approval from the owner or guardian before entering private property or cave reserves.
   (b) They will follow normal procedures regarding gates on properties or reserves.
   (c) They will not, except in cases of dire emergency, presume on the goodwill of property owners in dry areas for supplies of water. Prior arrangements must be made.
   (d) They will take care to avoid interference with crops or stack.
   (e) They will, where a cave entrance has been blocked by the owner to prevent injury to livestock, reblock the entrance after use and will liase with the owner to erect a fence or some other less offensive means to protect the integrity of the entrance.
   (f) They will not conduct any dig, on the surface or underground, without the express permission of the landowner, (or management authority) and their society committee.
   (g) The use of explosives is not encouraged. Any use of explosives should only be with the express permission of the landowner(or management authority) and their society committees.
   (h) They will not construct a gate in a cave without first obtaining the permission of the landowner (or management authority) and their society committee, and ensuring that permenent provision is made for the security of the keys.
   (i) They will not construct a gate in a cave without an accompanying sign explaining the reasons for restricting access, and the circumstances under which authorised visits are possible.
5. (a) They will not leave rubbish in caves; their own or other people's. Spent carbide, flash-bulbs, wrappings and other refuse must be brought out of the cave.
   (b) They will not disfigure caves by unnecessary markings. Survey marks should be small and inconspicious.
   (c) They will take care to avoid destruction or disfiguration of cave decoration and any other natural features of the cave. Disturbance should be confined to tracks. In areas of clean flowstone floors, muddy clothing or boots must be removed and only clean clothing worn. Tracks should be rigidly adhered to. Helmets should be removed in the vicinity of stalagtite clusters.
   (d) They will not under any circumstances leave faeces in a cave; they will prepare themselves beforehand, or when underground, make provision for the removal of faeces.
   (e) They will take stringent precautions to isolate artificially introduced organic wastes from caves.
   (f) They will not smoke in any cave.
   (g) They will not carry out any tracing experiments in karst areas without having first carefully assessed the varying tracing agents and techniques available, and selecting only those which can be shown to present no danger of damage to the cave or the disturbance of flora and fauna under the circumstances of the experiment.
6. (a) They will, when visiting an area frequently visited by another club, do all in their power to co-operate with that club.
   (b) They will conduct disputes in a restrained and gentlemanly manner.
7. (a) They will behave responsibly in environmental matters.
   (b) They will endeavour to protect the caves of Australia.

GUIDELINES FOR NAMING CAVES AND CAVE FEATURES

Albert Goede
Dept of Geography
University of Tasmania

Adopted in January 1979
Replaces ASF Nomenclature Code of 1968

INTRODUCTION

Increasing concern with nomenclature should stem from a number of causes. Clearly as the number of cavers, clubs and caves has grown in recent years there is an increasing likelihood of duplication of names and conflicts about naming. Many of these problems have surfaced recently as a result of the cave documentation required for the compilation of the cave index. In fact, the publication of the index should play an important role in rationalising nomenclature. For example, such a computerized index can readily be used to provide alphabetical lists of cave names (both approved and suggested) for each State so that the duplication of names can be avoided.

As any member of a nomenclature body can testify the average person is not particularly original when it comes to proposing new names. The same applies to caves and karst features, e.g. Bone Cave, Main Cave, Bat Cave, Cathedral, etc.

In Australia the official naming of natural features (and many man-made ones) is the responsibility of the individual State governments. Hence, in every State there is a government appointed board or committee to deal with nomenclature problems and to make decisions on names.

In Tasmania, the State with which I am most familiar, this is the task of the Nomenclature Board of Tasmania which was set up in 1950 as an Advisory Board to assist the Surveyor-General on matters of nomenclature. It was formally recognized in 1953 and established on a permanent basis by an amendment to the Survey Co-ordination Act. The board consists of a number of representatives from various government departments together with four outside members appointed by the Minister of the Lands Department.

In Queensland the Queensland Place Names Board was established in 1958 as the official naming authority. It also consists of representatives of government departments together with outside members from several boards and learned societies as well as two members nominated by the Senate of the University of Queensland. I am not familiar at this stage with the situation in other States.

If names of caves and other features are to be officially recognized it is important for speleologists to be aware of the rules of nomenclature that are generally accepted by such boards and to abide by them when new names are proposed. It is also important that there should be channels of communication between speleologists on the one hand and nomenclature bodies on the other. In States where there is more than one speleological society such contacts are best maintained by State liaison councils. In States where no such council exists the State Karst Index Co-ordinator is at present the obvious person to fill the function of communication between speleologists and nomenclature bodies.

I am very grateful to Greg Middleton, Elery Hamilton-Smith and Peter Matthews who made numerous valuable contributions which have been taken into account in the Guidelines. I also received comments from my fellow members on the Nomenclature Board of Tasmania and from the Blue Mountains Speleological Society.

PURPOSES FOR NAMING

The naming of natural features serves several purposes.

1. **Identification.** A name provides a means of identification which serves to distinguish a feature from all other features. The more widely known the name, the better the purpose is served but also the more difficult it becomes to substitute another name. Identification does not require a name. The purpose is also served by an identification system of codes usually consisting of combinations of numbers and letters. Such a system has grown up piecemeal in Australia and was formalized by Matthews (1974) as a requirement for cave documentation. An important and well-known cave system is much more readily identified by a name than by a number (e.g. JF-4 - Khazad dûm, etc.). On the other hand small caves of little or no significance are much better left un-named to prevent undue proliferation of names.

2. **Description.** A good name often embodies an element of description. Triviality in naming should be avoided. Names suggested by some peculiarity or outstanding attribute of the feature to be named are generally acceptable. Even names such as Croesus Cave and Kubla Khan are in a sense descriptive as they hint at the richness of formations found in these caves.

3. **Commemoration.** Names may commemorate historical events or a prominent person. In caving, historical events are not necessarily remote in time as most of the country's caves have been explored in the last thirty years, e.g. Rescue Pot in the Junee Florentine area commemorates the rescue of two novice cavers who came to grief here in 1968. Names such as Good Friday Cave (S.A.) and Easter Cave (W.A.) are other examples of commemoration.

   Names of prominent persons still living are generally acceptable to official nomenclature boards only if the features are names after royalty or representatives of royalty (e.g. in Australia a State governor or governor-general). Politicians most definitely do not come into this category.

RECOMMENDATIONS

We must consider two sets of guidelines. The first set is concerned with the procedures which ASF should consider adopting in order to formalize naming of caves and related features and to provide formal communication channels with the appropriate State and federal statutory authorities for geographical nomenclature. These will be referred to as procedural guidelines. The second set of guidelines is concerned with the actual naming process and is designed to ensure that new names will be generally acceptable if the need should arise to submit them for formal approval. They will be referred to as naming guidelines.

PROCEDURAL GUIDELINES

1. Speleological societies in each State and territory should establish formal procedural bodies for the naming of caves and karst features and the recording of existing names together with adequate descriptive and locational details. Such bodies should also have the task of

maintaining liaison with the ASF Documentation Convenor and with the relevant State and federal nomenclature boards.

Comment: Where State co-ordination councils exist as in N.S.W. they could take on this responsibility. In States where more than one society exists but where there is no co-ordinating council, a representative inter-society organisation should be established. In States with a single caving society, that society should take the responsibility.

2. The ASF Karst Index should be regarded as the standard reference on the nomenclature of caves and karst features unless the entry indicates that a particular name has not been accepted or is not generally acceptable.

3. Individuals, societies and nomenclature bodies associated with the ASF should do all within their power to limit the submission of names to official naming bodies to the minimum necessary for the sake of cave conservation.

Comment: Official acceptance of a name will inevitably result in its publication in Government Gazettes with grid references indicating its location. Once approved, names may be indicated on official maps.

NAMING GUIDELINES

The following set of naming guidelines were developed from the following sources: Anon (1968), Wilcock (1968), Hamilton-Smith (1967) and Middleton (1978), together with comments from a number of individuals.

1. Persons assigning names to caves, cave features or cave related features should try to be descriptive, constructive and original in their choice of names.

2. New names should be used or published only where the location and nature of the feature have been accurately recorded in society records.

Comment: All too often in the past, names have been approved without adequate descriptive and location data. This causes lasting problems if a cave is subsequently 'lost' - a not uncommon happening in the dense Tasmanian bush or the wide expanse of the Nullarbor. When rediscovered years later, the identity of such a cave may be almost impossible to establish with certainty.

3. The same name should not be assigned to more than one feature, particularly in the same region. Where duplication is discovered it may constitute adequate grounds for changing one of the names.

Comment: See Comment after Rule 18.

4. It is preferable to create a new name for an un-named feature rather than to adapt an existing name of a nearby feature by addition of 'north', 'south', 'central', 'no. 2', etc.

Comment: A particulary bad example of this practice is found in the Mole Creek area of Tasmania where we have Honeycomb 1, Honeycomb 1 1/2, Honeycomb 2 and Honeycomb 3. Less extreme examples can be found in most States.

5. A name should be concise, euphonious and not such as might give offence.

   Comment: This may rule out some apt and witty names. Names such as Lillians Rift and Devils Earhole (Mole Creek) sail close to the wind and a name such as Sharlands Organ (a formation in Kubla Khan, Mole Creek) is definitely not acceptable to any nomenclature body - even allowing for a sense of humour.

6. Names should not be applied to trivial or insignificant features.

   Comment: If in doubt err on the safe side. It is easier to apply a name at a later stage than have to withdraw a name applied in haste.

7. Caves should not be named after temporary features.

   Comment: A South Australian example is Haystall Cave, so named because its entrance was located close to a haystall. The haystall was moved a week after its discovery. (Incidently, as the cave's location had also been described by reference to the haystall, it took some years to rediscover).

8. Caves should not be named after living persons unless in very exceptional circumstances. On no account should a cave be named after a caver or speleologist during his or her lifetime.

   Comment: In recent years a number of caves at Colong in N.S.W. and along the Gordon and Franklin Rivers in Western Tasmania have been named after contemporary State and federal politicians. I am personally strongly opposed to this practice which I believe to be a means of attracting cheap publicity for the cause of conservation which might be better served by a proper evaluation of the scenic, sporting and scientific values of the caves and limestone areas concerned. However, the viewpoint has been put to me by one well known caver that the phrase 'exceptional circumstances' in the above guideline should include the possibility of "the naming of a cave which is in imminent danger of destruction after a politician who could act to save it, so as to draw public attention to the cave's existence".

   If the above guideline is accepted, ASF will have to interpret the term 'exceptional circumstances' in relation to this practice.

9. Caves should be named after deceased persons only when they have made some major contribution to the community or have some link with the cave or area or have played a significant part in exploring, conserving or researching a particular cave or area.

   Comment: In Australia, features with personal names are often given the name of the person to whom the original grant of the land on which the feature occurs was made.

10. Where features are named after persons, it is customary not to involve the use of both Christian and surname or a combination of the two.

11. Where personal names are used, the possessive 's' is omitted unless this destroys the euphony or descriptive application of the name. If the possessive 's' is used, the apostrophe should be omitted, e.g. Scotts Cave not Scott's Cave.

12. Use of hyphens should be avoided in new names.

13. Names composed of a large number of words should be avoided.

    Comment: An official nomenclature body might take a dim view of a name such as 'Tower of London Cave' at Chillagoe, Queensland, although they would probably approve it if it were well established. 'The Cave with the Thing that went Thump' at Mt. Etna would definitely not be approved.

14. Combinations of unrelated words, anagrams or words which are too close in spelling or phonetics, should not be used.

    Comment: At Mole Creek, Tasmania, three originally separate caves were subsequently linked by further exploration. The combined system has been referred to as the Spider-Pyramid-Cow System by combining the three names. In this particular case such a combination groups unrelated names and seems undesirable.

15. Long and difficult aboriginal, botanic or scientific names are best avoided. If an aboriginal name is used, it should be in the language or dialect appropriate to the region and should follow the standard spellings now in use by aboriginal linguists.

16. Corrupted or modified names should not be used unless such forms are well established by local usage.

17. Names that can be construed as advertising a particular commercial or industrial enterprise are not acceptable.

18. If more than one name is available for a cave or feature, the historically earliest name should be accepted unless either (a) another name is well established in local usage or (b) a change has to be made to eliminate confusion.

    Comment: An example of (b) is Federal Cave at Murrindal, the name of which was changed to Anticline Cave to eliminate confusion with Federal Cave at Buchan, only a short distance away.

19. Changing an already accepted name should be avoided unless there are very compelling reasons for doing so. Where an existing name has been used in a scientific description, e.g. to name a geological formation or as the type locality of a new species of cave fauna, the name should **never** be assigned to any other feature.

20. Where two or more caves, originally thought to be physically separate, are subsequently connected the use of different names for parts of the linked system should preferably be discontinued.

    Comment: In the naming of caves a problem often arises in that two or more caves, regarded as distinct and named as such, may subsequently be linked to one another by further exploration. One possible solution would be to assign the name of the longest component cave to the whole of the system unless there are compelling reasons for not doing so, e.g. if one of the smaller components is a type site for geological or biological description.

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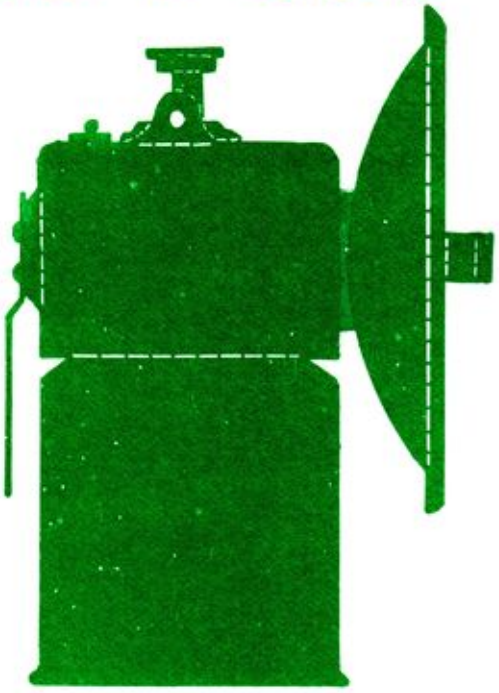

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BULLETIN of the SYDNEY UNIVERSITY SPELEOLOGICAL SOCIETY

BOX 35, HOLME BUILDING,
UNIVERSITY OF SYDNEY,
N.S.W. 2006

Future Events

Oct. 25/26 Wheengee Whungee Canyon (Kanangra Region) Keir 516 5239
28 Committee Meeting
Nov. 1/2 Kalang Canyon Keir
6 Meeting - Assoc. Prof. David Branagan (Founding Member of SUSS) on early SUSS, David Rothery on his discoveries at Bungonia, Keir on Computing and Surveying.
8/9 Bungonia Keir 516 5239
15/16 Cliefden (permit pending) Pat 684 1714
22/23 Kanangra / Danai Keir
25 Committee Meeting
29/30 Jenolan Martin 449 4092
Dec. 4 Meeting
5/6 Christmas Party Kilkare Beach Mike Gibian 44 3578
Jan. ASF Conference - Sydney (Have you paid yet?)