

## **Oxford University Cave Club**

### **Risk Assessment - June 2019**

The risks involved in cave exploration appear extensive and serious. However, serious accidents are rare. This document outlines measures that can be taken to minimise the risks associated with particular hazards. The **OUCC Code of Conduct** describes in more detail the measures that should be taken to reduce the number of incidents and to reduce the severity of any that may occur. The Code of Conduct also gives information about the steps to be taken should a caving group suffer an accident or incident, or if a group is overdue from a caving trip; this information is also summarised in the front of the Logbook.

This document can only give guidelines, as the severity and the likelihood of risk will vary markedly for different trips, weather conditions and members of the team, may change while you are underground and because one incident can readily lead to others (see section 1). This concatenation of associated risks means that a standard “likelihood x severity” assessment for individual risks may severely underestimate the overall risk, and is not appropriate for caving. The Risk Assessments that count are those that arise from the judgments you make of the severity and the likelihood of the different risks, separately and in combination, before and during a particular trip.

This document will be updated or altered as and when problems are highlighted, and after consultation between club members, other cavers and bodies such as the British Caving Association, British Cave Research Association and the OU Sports Federation.

The Risk Assessment is divided into four sections:

1. Problems which can occur after an adverse incident.
2. Hazards specific to the cave environment.
3. Hazards in cave location / return from cave.
4. Hazards associated with use of equipment such as transport, ropes, ladders, lamps, SRT kit, catering.

**Problems which may occur after an adverse event**

This section is put before the others because it is very important to recognise that *any* initial incident in a caving trip can have knock-on effects far more serious than the incident itself. Even a serious fall on an entrance pitch in a cave near to a road may result in quick and effective rescue: a sprained ankle deep within a cave may lead to a slow exit, light failure, a fall, injury, etc. A tightening spiral of exhaustion, hypothermia and further incidents/injuries can ensue. This makes it impossible to assign meaningful “severity & probability” factors to risks.

<b>Problem</b>	<b>Adverse event</b>	<b>Measures to reduce risk and prevent worsening situation</b>
<p><b>Exhaustion</b> May lead to errors of judgement, increased risk of injury, increased risk of hypothermia. (exhaustion / exposure syndrome)</p>	<ol style="list-style-type: none"> <li>1. Lack of personal fitness appropriate to environment</li> <li>2. Not enough food before / during trip.</li> </ol>	Personal fitness & experience Cave within limitations of group Mutual assistance over difficult terrain Appropriate clothing Adequate food & liquid prior to trip Food taken on trip Appropriate group size. Appropriate callout time
<p><b>Hypothermia</b> May lead to errors in judgement, incapacity, worst case death</p>	<ol style="list-style-type: none"> <li>1. Any event which causes immobility or slow progress through cave.</li> <li>2. Getting wet</li> <li>3. Exhaustion</li> <li>4. Ill health</li> </ol>	Cave within limitations of group Appropriate group size. Appropriate clothing. Survival bag / extra clothing / food Reasonable attempts to stay dry Adequate food & liquid prior to trip Awareness of symptoms of hypothermia Warm dry clothes available immediately after trip If serious call cave rescue First aid training Appropriate callout time.
<p><b>Injury</b> Any incapacitating injury underground is extremely serious and potentially fatal. Greatly increased risk of hypothermia to victim and team</p>	<ol style="list-style-type: none"> <li>1. Exhaustion</li> <li>2. Hypothermia</li> <li>3. Light failure</li> <li>4. Carelessness</li> <li>5. Rock fall</li> <li>6. Personal fall</li> <li>7. Equipment failure</li> <li>8. Poor personal technique.</li> </ol>	Personal fitness Experience. Avoid injury. First aid training. First aid kit carried & more extensive kit above ground. Appropriate group size. Appropriate callout time.

**Hazards of the cave environment**

<b>Hazard</b>	<b>Associated risks</b>	<b>Measures to reduce risk</b>
<b>Darkness</b>	1. Unable to progress or exit 2. Falling ⇒ injury  (1) and (2) leading to cold, etc.	Good working lamp. Spare light source/+ batteries Whistle to attract help Survival bag/food/clothing carried. Appropriate call out time Appropriate group size.
<b>Cold</b>	1. Hypothermia 2. Exhaustion	Appropriate clothing Good prior intake of food and liquid. Survival bag/food/extra clothing
<b>Water</b>	1. Hypothermia 2. Trapped by rise in levels 3. Drowning	Check weather forecast. Prior knowledge of particular system. Avoid unnecessary contact with water. Appropriate clothing/survival bag. Monitor water levels continuously Appropriate call out time.
<b>Constricted areas</b>	1. Getting stuck	Prior knowledge of system. Caution exercised; know your limits Appropriate call out time.
<b>Uneven terrain with sudden drops</b>	1. Falling ⇒ injury 2. Strenuous / slow movement ⇒ hypothermia and exhaustion	Cave in groups. Caution exercised at all times. Use of aids where appropriate. Appropriate call out time.
<b>Loose rocks</b>	1. Strike ⇒ injury 2. Crushing ⇒ injury 3. Collapse ⇒ trapping (hypothermia/exhaustion)	Wear helmet. Avoid hazardous areas if possible. Prior knowledge of system. Regular review of journals / noticeboards and consultation with other cavers. Food, spare light, survival bag, extra clothing carried. Cave in groups. Appropriate call out time.
<b>Complex Systems</b>	1. getting lost → Group split up 2. Lamps run out 3. hypothermia/exhaustion 4. unable to exit	Prior knowledge of system. Consult survey. Stay together. Carry whistles, spare lights, survival equipment. Appropriate call out time.
<b>Noise (Waterfalls, echoes)</b>	1. Communication difficult.	Carry Whistles. Awareness of calls or signals for pitches.
<b>Poor air quality</b>	1. Headaches 2. Breathing difficulties, unconsciousness, death	Prior knowledge of system; avoidance of all reported areas. Immediate exit if problems encountered.

**Hazards in cave location/return from cave**

<b>Hazard</b>	<b>Associated risks</b>	<b>Measures to reduce risks</b>
<ul style="list-style-type: none"> <li>• • <b>Darkness</b></li> <li>• <b>Cold</b></li> <li><b>Uneven terrain with sudden drops</b></li> </ul>	As for cave environment	As for cave environment, plus Familiarity with route to / from cave. Carry map and compass (can be left in cave entrance) Stay together. Carry whistles, survival kit, food. Appropriate clothing for surface. (can be left in cave entrance)
<b>Bad weather</b>	<ol style="list-style-type: none"> <li>1. Getting lost</li> <li>2. Group splits up</li> <li>3. Hypothermia/exhaustion</li> </ol>	As above

**Hazards specific to equipment**

<b>Hazard</b>	<b>Associated risks</b>	<b>Measures to reduce risks</b>
<b>Transport</b>	<ol style="list-style-type: none"> <li>1. Accident due to unfamiliarity with vehicle</li> <li>2. Accident due to driver tiredness</li> </ol>	<ol style="list-style-type: none"> <li>1. All drivers of hire vehicles undergo OUSF assessment</li> <li>2. Two drivers whenever possible for journeys over 3hrs duration; Frequent breaks encouraged; Appropriate cave trips (length, start time, grade) for driver and others on “return day”.</li> </ol>
<b>In-situ gear</b>	<ol style="list-style-type: none"> <li>1. Failure of fixed belay points (rock anchors, P-hangers, etc.) Failure of</li> <li>2. fixed aids (handlines, slings, fixed ropes and ladders, etc)</li> </ol>	Review of journals / notice boards regarding condition of in-situ gear. Condition of fixed belays checked before use. Multiple belays used where appropriate. Fixed aids used with caution, or replaced.

<p><b>Rope</b></p>	<ol style="list-style-type: none"> <li>1. Belay failure due to poor rigging</li> <li>2. Rope failure due to rubbing (poor rigging)</li> <li>3. Rope failure due to weakening from prior usage (abrasion, shock, etc.)</li> <li>4. Rope failure due to weakening from poor storage (chemical or UV attack)</li> <li>5. Rope too short for pitch</li> </ol> <p>A) All could lead to falls resulting in injury or death. B) Rope failure can entrap those below pitch.</p>	<p>A) 1, 2. Riggers have appropriate experience and competence. All cavers check rigging before use. 3, 4. Rope and belays checked before usage. 3, 4. Rope and belays correctly maintained. 4. Rope to be stored and transported appropriately 5. Ensure knot in end of rope. B) Carry whistles, spare lights, survival equipment. Appropriate call out time.</p>
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<p><b>Ladders</b></p>	<ol style="list-style-type: none"> <li>1. Belay failure due to poor rigging</li> <li>2. Ladder failure due to weakening from prior usage (severe bending, shock, etc.)</li> <li>3. Ladder failure due to weakening from poor storage (chemical attack)</li> <li>4. Climber exhaustion leads to fall.</li> <li>4. Poor climbing technique leads to fall.</li> <li>5. Fall not held by lifeliner</li> <li>6. Falling climber pulls off lifeliner.</li> </ol>	<ol style="list-style-type: none"> <li>1. Riggers have appropriate experience and competence. All cavers check rigging before use.</li> <li>2, 3. Ladder and belays checked before usage.</li> <li>2, 3. Ladder and belays correctly maintained. 3. Ladder to be stored and transported appropriately</li> <li>1-5. Lifeline always used to protect climber, either self-lined, or lined by other caver.</li> <li>4,5: Personal fitness and experience.</li> <li>6. Lifeliner uses appropriate technique.</li> <li>7. Lifeliner properly attached to belay.</li> </ol>
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<p><b>Rigging</b></p>	<ol style="list-style-type: none"> <li>1. Rigger not attached and falls when rigging</li> <li>2. Rigger not attached and falls when derigging</li> </ol>	<p>1, 2 Riggers should be attached either by cowstails to a suitable attachment point or must be attached to a properly rigged traverse rope by a hand jammer 1, 2 Riggers should when possible rig traverse lines to pitch heads from a reasonable distance from the pitch head so they are always attached when above the drop 1,2 Riggers have appropriate experience and competence</p>
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<p><b>Lamps</b></p>	<ol style="list-style-type: none"> <li>1. Failure (see darkness)</li> <li>2. Acid/alkali leaks =&gt;chemical burns or rope failure (see rope)</li> <li>3. Carbide =&gt; chemical burns, explosions, thermal burns</li> </ol>	<p>Spare lights carried. Long-life LED lamps preferred. Spare batteries carried. Defective lamps reported, taken out of use. Wet cell and carbide lamps stored separately from rope. Caution when handling carbide. No naked flames, must be stored dry, dust washed/brushed off skin, clothing rope, etc.</p>
<p><b>Personal Equipment (Clothing, helmets, boots, etc.)</b></p>	<ol style="list-style-type: none"> <li>1. Inappropriate clothing =&gt;Hypothermia. Inappropriate or worn equipment. =&gt; Failure=&gt; injury/death</li> <li>2.</li> </ol>	<p>Proper maintenance of personal gear Pre caving checks.</p>
<p><b>Personal SRT kit</b></p>	<ol style="list-style-type: none"> <li>1. Failure of harness / cowstails, etc. =&gt; injury/death.</li> <li>2. Failure or loss of ascenders, etc. =&gt; may slow or prevent exit. (hypothermia/exhaustion) Poor technique =&gt; fall, injury/death.</li> <li>3.</li> <li>4. Poor technique may slow or prevent exit. (hypothermia/exhaustion)</li> </ol>	<p>1,2. Frequent inspection and good maintenance of personal equipment. 3,4 Personal competence in SRT. 2,4 Carry whistles, spare lights, survival equipment, first aid kit. 2,4. Appropriate call out time.</p>
<p><b>Catering</b></p>	<ol style="list-style-type: none"> <li>1. Cuts</li> <li>2. Scalds/burns</li> <li>3. Fire</li> <li>4. Food poisoning</li> </ol>	<p>1,2. Normal caution exercised. 1,2. First aid kit available 3. Fire extinguisher available. 4. Good hygiene.</p>