

SAFETY WITH GEM AND MINERAL COLLECTING

R. Bottrill, 13/12/2008

(Loosely adapted from the publication: Lockwood, A., 2003, Risk assessments for Geological field excursions". The Russell Society, England.)

Introduction

One of the major benefits to be derived from an interest in gems, minerals, fossils and other geological materials is the opportunity an individual or a family group has of attending organised field excursions to geological exposures and collecting sites. These can often entail visits to what are normally restricted places, such as working quarries or pits, underground mines, or to sites on private land for which special permission is necessary.

Most land owners, including quarry operators, are usually quite willing to give consent for an organised group to visit their property for the purpose of geological study and, in certain circumstances, to undertake limited collecting of minerals and other geological materials. However, they are concerned that neither they, their tenants, or anyone else having legitimate use of the land should suffer any injury or loss as a result of such visits and that should any damage be caused to their property this will be repaired or reinstated at no cost to themselves.

If the site is one covered by the Workplace Safety Act the site manager has a legal responsibility for ensuring the safety of any visitors and may require you to wear certain personal protective equipment (PPE) and to follow various instructions that will be explained to you on arrival. This includes most state forestry areas, usually managed by Forestry Tasmania.

You are legally obliged to wear such protective equipment on site and to follow any instructions given.

If an accident does occur on a site, apart from the pain and suffering caused to the injured party, the manager himself will be held responsible for the incident and will be put to considerable inconvenience in having to make out reports, attend meetings, and fill in forms for submission to the Health and Safety authorities. Such incidents, as well as non-compliance of instructions given on site, often lead to mines and quarries being put out of bounds to visiting groups.

In industry, risk assessments have been a major contributory factor to the reduction of accidents and fatalities, and it is strongly recommended that they are carried out for all field excursions.

Specific Risks

1. UNDERGROUND MINES AND CAVES

Entering mines and caves alone is foolhardy and should never be attempted.

Risks involved may include:

• Roof falls.	• Stope collapse.
• Spoil heap slumping.	• Old buildings, plant and equipment.
• Excavations.	• Dangerous gases.
• Contaminated water.	• Dead animals.
• Wall-bursts.	• Changing weather conditions
• Toxic minerals.	• Getting lost.
• Open shafts.	• Running out of sources of light.
• Hidden shafts and deep water.	• Getting lost underground.

Actions:

People should never enter a mine or cave unless they have the authority of the leasee or landowner, adequate training has taken place, they are properly equipped and have trained and experienced leaders with them. Ensure there is at least one individual who is responsible for the numbers of people attending and will be aware of where people are at all times. The group should be kept small, e.g. about 5 visitors for every experienced supervisor.

Always be alert for open or covered shafts, deep water, unstable ground and other hidden dangers.

Check the weather forecast: rain can cause flash flooding underground.

There are many disused mines from which the waste material has been dumped on tips or hillsides. Most of these tips are old and quite stable, but prolonged rainfall can sometimes affect slope stability. Be very careful when digging holes in such places as you may break into an old shaft or pit. Do not make excavations in the vicinity of old buildings, walls, or derelict plant, as you may bring about a collapse.

2. ACTIVE QUARRIES AND PITS

You should never enter an active quarry or pit without the written permission of the owner or operator. Full P.P.E. should be worn.

Risks involved may include:

* Unstable overhangs and near-vertical faces.	* Unstable stockpiles.
* Blasting.	* HT Electrical cables
* Conveyors.	* Hypo/hyper-thermia.
* Heavy vehicles	* Mine plant and machinery.
* Excavations.	* Slippery ground.
* Drainage sumps with water of unknown depth.	* Frozen water.
* Polluted water.	* The stability of vertical faces can be seriously affected by heavy rainfall or icy conditions.

Actions

- * Do not approach the vertical face of any working, without express permission, or go beyond the bund, boulder or guard rail protection.
- * Ensure your party vacates the quarry and enters the 'safe area' before any blasting takes place. Do not re-enter the quarry after blasting until given permission to do so.
- * Keep away from all working machinery and the active working face.
- * Stand well clear of any conveyors, crushing and screening equipment.
- * Vehicles must be given priority of movement at all times.
- * Do not touch any cables or electrical switchgear.
- * Do not clamber up boulder or scree slopes and do not work above people collecting at a lower level.
- * Do not approach any sludge pit, lagoon or sump hole - their depth is often deceptive. Do not walk on areas covered with ice.
- * Avoid exposure, both from heat and cold, but do not remove any mandatory protective equipment or clothing.
- * Do not go into water or mud of unknown depth. Never be tempted to swim in a flooded pit however warm the day. Sometimes the water is very deep and cold, and entering it can cause seizure or cramp.

Many flooded pits have an additional hazard produced by a bloom of blue-green algae, which can produce toxins giving rise to rashes following skin contact and serious illness if accidentally swallowed.

3. MOUNTAINS AND ISOLATED AREAS

Risks involved may include:

* Becoming lost or separated.	* Obscure mine shafts.
* Deteriorating weather such as fog or snow (white-out).	* Venomous snakes.
* Weak/dangerous cliffs.	* Dangerous ants, spiders etc.
* Falling rocks.	* Steep edges.
* Weak/dangerous cliffs.	* Bushfires.
* Scree avalanche.	* Track condition (eg. slippery).
* Boggy ground.	* Fissures in the ground.
* River/ stream crossings.	* Dehydration.
* Impenetrable vegetation.	* Hypo/hyper-thermia.

Actions:

- Never go into isolated areas (areas where you are unlikely to meet other people) unless you have an experienced leader.
- Have an experienced member of the group bringing up the rear, who knows exactly where the group is heading.
- Ensure that a responsible local person knows where the group intends to go and what time they plan to be back. When the group arrives back ensure this person is advised of their safe return.
- Consider carrying a mobile 'phone and EPIRB with you.
- Ensure the group keeps together. The leader may have to slow the pace accordingly.
- Carry a whistle, map and compass and ensure someone, other than the leader, knows how to map read and take bearings.
- GPS may be useful but there is no substitute for a detailed map.
- Check the weather forecast. In central and western Tasmania, be prepared for snow and rain at any time of year, and very sudden changes in weather.
- **Always** take appropriate clothing – usually including a warm pullover and brightly coloured waterproof clothing and wear sturdy footwear.
- Whenever working in the sun wear a broad rimmed hat and use a sun-block preparation (particularly November to March). The ozone layer is thin and the Tasmanian sun may feel cool, but can burn rapidly.
- Carry some food and water, especially if temperatures get high.
- Leeches, ants and snakes can be a nuisance, and some insects, such as “jack-jumper” ants, bees and wasps can give life-threatening reactions from stings with many people, as can some local spiders, snakes and sea creatures. All are best avoided and suitable (long and tight-fitting) clothing and footwear is recommended.
- A first aid kit should be carried by the tour leader, but if you have particular requirements you are advised to bring your own.
- Check with the local Fire department about potential bushfires.
- Fires to be lit in designated fireplaces only.

4. DISUSED OR ABANDONED QUARRIES OR PITS

Many of the risks associated with active quarries and pits are also associated with disused ones (see also sections 1 and 2). Make sure a thorough risk assessment is undertaken.

Risks involved may include:

• Site may be used for other dangerous purposes such as shooting or motorcycle scrambling.
▪ Unstable faces
• Floors and faces can be overgrown which may disguise hazards.
• Occasionally, hazardous waste may have been illegally dumped and without signage.
• Hidden drainage channels.
• Flooded pits.

Actions:

- * Never attempt to enter disused pits or quarries without permission from landowners and/or lessees.
- * Follow the same principles as for a visit to a working quarry or pit, but realise that the site, including workings and equipment, will have deteriorated and probably not be managed for safety issues.
- * Respect the rights of other authorised users, such as fishing clubs.

5. COASTAL EXPOSURES INCLUDING TIDAL RIVERS

Risks involved may include:

* Tides and/or strong on or off shore winds.	* Access to and from the shore.
* Unpredictable weather.	* Sea walls (not fenced or guarded).
* Exposure to cold (hypothermia).	* Exposure to sun and heat exhaustion (hyperthermia).
* Slippery rocks.	* Quicksand and soft ground.
* Mudflows and landslips.	* Falling rocks and other debris from cliffs.
* Beach debris including broken glass, barbed wire, etc.	* Marine life, living or otherwise, causing painful stings.
* Sources of pollution such as sewage outfalls.	* Deep pools and fissures in the ground.

Actions:

- Check tide table beforehand and make the visit on a falling tide.
- Check weather forecasts.
- Allow plenty of time for a safe return around any headlands where there is a risk of being cut off by an incoming tide.
- Carry a mobile 'phone and have the telephone number of the coast guard, doctor and hospital with you.
- Warn members of the party of the various hazards and ensure they do not put themselves or other people at risk.

- Do not allow people to climb cliffs unless they are trained and equipped to do so.
- Keep the party together and do not allow people to wander off.

6. COLLECTING, STUDYING AND DISPLAYING MINERALS

General Risks, besides field hazards, may include:

- Toxic minerals. Most minerals are highly insoluble and thus not highly toxic in their natural state but, especially where they contain base metals like lead, copper or arsenic, should generally be considered as potentially dangerous.
- Radioactive minerals.
- Asbestos and asbestiform minerals and other inhalable dusts
- Dangerous acids and other chemicals
- Eye damage from rock chips
- Rock saws, splitters and other equipment

Actions:

- Minerals should not be ingested or inhaled, particularly those containing base metals.
- When collecting from mine dumps ensure that blown dust does not get into your eyes.
- It is advisable not to eat, drink or smoke in the field if you have been in contact with potentially toxic materials; ensure that your hands are thoroughly washed before eating.
- Asbestiform minerals, usually fibrous varieties of chrysotile or various amphiboles, are potentially carcinogenic if inhaled and should only be handled with great care.
- Samples containing suspected asbestiform minerals should be enclosed as much as possible and be handled as little as possible, and not be treated in such a way as to produce any respirable dust.
- Quartz dust is also a respirable carcinogenic so avoid generating lots of such dust in poorly ventilated areas (eg. by crushing, drilling or sawing rocks).
- Avoid collecting more than small amounts of radioactive minerals; they can be dangerous if kept in poorly ventilated areas or close to the body, and should only be handled with care.
- Avoid collecting radioactive minerals in poorly ventilated areas.
- Use safety glasses or other protection when using rock splitters, hammers and saws, etc.
- If you are using acids or other potentially dangerous chemicals on rocks or minerals, obtain an MSDS from the manufacturer or an OHS website, and take all recommended precautions.
- If you are displaying minerals to the general public it is advisable to exclude all radioactive specimens and asbestos, and to keep any toxic minerals in display boxes or, out of reach, where they cannot be touched.
- Do not give any suspect mineral specimens to children.