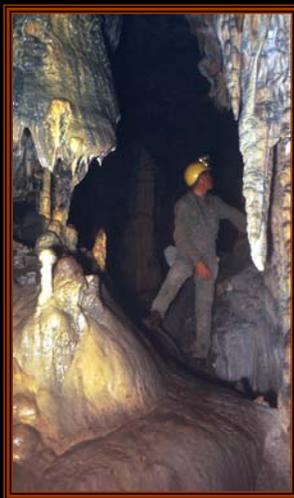


Cave Exploration-Search & Rescue & Pre-Planning



Cave Exploring-Equipment and Safety and Health



Equipment

- hard hat,
- at least three sources of light,
- sturdy shoes/boots,
- cover-alls,
- gloves,
- knee pads,
- a caver's pack,
- and food and water



Health and Safety



- Caves are natural features, which require the same level of attention to safety as any other outdoor activity.
- Due to the wide variety of terrain found within caves, knowledge of accepted practices and techniques is necessary for assessing the requirements of individual situations. In most cases, unsafe situations can be avoided by enforcing good safety policies and insisting on qualified trip leaders. Trip-leader criteria should be established and training provided.

Search and Rescue

- Cave-related search and rescue activities and tactics should be outlined in the park's search and rescue plan, as an appendix to the emergency operations plan. It should address protection of cave resources to the extent possible. The plan should also address the park's interaction with outside cave rescue groups. They may be critical to successful efforts, especially if the park has no staff with cave expertise.



Radon

- Levels of alpha radiation within some caves are sufficiently high to warrant setting limits of exposure based on the highest monthly readings recorded within the cave (29 CFR 1910.1096 Airborne Radiation Hazards). The radiation is caused primarily by the radioactive decay of radon 222. Some additional radiation is generated by the radioactive decay of radon 220 (thoron). Working levels of alpha radiation are measured from the radon and thoron decay products (particulates), and exposure records are maintained for all employees routinely exposed to the cave atmosphere.

Bad Air



- The most common problem associated with air in caves is the buildup of CO₂ in low-lying areas of rotting vegetation. Cavers should be able to recognize the effects of elevated CO₂ concentrations and must immediately leave the affected area.

Rockfall and Flash Flood



- Rockfall is usually the result of caver activity. To avoid injury, cavers should move carefully, and should always wear an approved helmet and stay out from under others who may be climbing a rock or a rope. Natural rockfall occurs most frequently near entrances where weather rates are higher.
- Individuals should not enter caves that are known to flood or those that appear to serve as drainage for large areas if rainfall is expected.

Infectious disease: Most infectious diseases associated with caves involve the animals that live in caves. Avoiding contact with animals and their feces will offer the best level of protection. In order to prevent possible health problems, anyone entering caves containing large numbers of bats, particularly during summer months, should take appropriate precautions. These precautions could include rabies pre-exposure shots, use of a respirator with a HEPA filter, and clothing that will prevent invertebrates from coming in contact with the caver's skin. However, anyone who is bitten or scratched by a bat needs to get rabies shots, even if they've already had the pre-exposure shots. It is also wise to avoid visiting caves when contaminated water is flowing through them.

Getting lost: Some cave passages involve a multitude of junctions and possible travel routes. In such situations, it is best to always have a member of the caving party who is familiar with the cave and to devise memory methods for retracing your steps. Foodstuff, strings, etc., can attract animals and may not remain in place. If lost, it is best to remain in one place. If this is not possible, carry a watch and paper and leave notes with the time as you travel; this will be of great assistance in helping searchers know where you have been and when you were last there.

Getting stuck: In most cases, an individual can get out of any passage that they can get into. (One exception may be a narrow slot in the bottom of a keyhole passage). Problems occur when gravity or apprehension become a factor in the situation. Calming the person down and/or removing some of their clothing can alleviate most situations. When in doubt, do not try to squeeze through a tight hole.



Darkness: Caves are dark. Backup lights should always be carried. Carry enough light to last longer than the trip's expected duration.

Hypothermia: Proper clothing should be worn when entering a cave. Hypothermia can become a problem when water is encountered or when the group moves too slowly. It is wise to carry spare clothing.

Dehydration: Dehydration can lead to many other complications, including hypothermia. Sometimes trips can run longer than expected. Carry enough food and water to last longer than the trip's expected duration.



SAR Pre-Planning Importance:

- Pre-plans organize personnel and equipment for urgent incidents.
- Provide guidance through the initial response.
- Pre-plan should be simple or it won't be used in times of crisis.
- Pre-plans should be easily accessible to key people (cave specialists, managers, and dispatchers).

Cave Specific Pre-Plan

Cave description:

- Details cave temperature, humidity, & hazards.
- Identify specific locations where obstacles exist (Map & Narrative)
- Special rope work, (what kind of haul system is needed)
- How much rope and equipment is needed for each location.
- Identify other special needs or obstacles such as tight restrictions, narrow or sharply twisting passage, water passages, or special communications needs.

Cave Specific Pre-Plan

Access:

- GPS coordinates
- Descriptions and maps of how to get to the cave (see if anyone's there)
- Maps of the cave showing hazards and special equipment needs
- The closest possible landing zone (GPS coordinates should be given)
- Vehicle Requirements (4X4, High Clearance)

General

- **Search initial response plan:** Informs manager or cave specialist who initially takes charge (Incident Commander) how to respond and who to initially involve. It should be the first part of the pre-plan since it describes the strategy to employ.
- **Rescue initial response plan:** Similar to the above, but specific to rescues.
- **Dispatcher's cave SAR "cheat sheet:"** Questions to ask the reporting party.

General

- **Cave rescue logistics**

- 1) Internal
- 2) Local (County and State Emergency Services)
- 3) Regional (Regional Cave Rescue Coordinator)

- **Medical pre-plan**

List of local medics who have cave training/expertise.

- **Forms**

- 1) Overdue caver questionnaire
- 2) Lost caver questionnaire
- 3) Injured caver questionnaire
- 4) Search Team debriefing sheet
- 5) Master copies of cave-specific forms



Generic Cave Search Pre-Plan

Search is an emergency. The search management sequence is:

- **1. Pre-plan** - Be prepared. Know the hazards and resources.
- **2. Interview** - Information must be gathered from first notice.
- **3. Call Out** - Trained help should be enlisted. At this stage, it is time to evaluate the urgency of the situation. This will determine the size and type of response. It is critical that in-cave tasks are dealt with by experienced cavers who can make the judgment calls needed underground.
- **4. Establish the Search Area** - In a cave incident, the entire cave may be considered in early stages, then establish segments in the cave and assign priority or rank.

Generic Cave Search Pre-Plan

- **5. Confinement and Attraction** - Know if the subject leaves the search area. Guard entrance(s), maintain accurate logs (who enters and leaves). Place lights with notes and other attractions at key cave intersections.
- **6. Hasty Search** - To begin active search, quickly check out the most likely places first. Check the obvious, look for clues, report conditions.
- **7. Wide search** - Search passages in order of priority. Allows for maximum search of cave with the available cavers in the fastest time.

Generic Cave Search Pre-Plan

- **8. Grid search** - As a last resort. Griding is slow and labor intensive. Clean up trip may be needed later to remove all of the notes and flagging. In complex cave systems this process could take a huge number of people an incredible amount of time.
- **9. Rescue/Suspension** - Whatever method used, the goal is finding the person or determine that they are not within the search area. If not located options are: (1) expand the search area, (2) scale down the operation. Do not quit, but to scale back. The decision to scale back is a management decision and should be carefully documented.
- **10. Critique** – Identify the problem areas and the efficiencies; what worked and what did not. How can the cave search be improved or prevented the next time?