



ADDENDA

1. Mineral Exploration Regulation in British Columbia

Mineral exploration in British Columbia is regulated by the
All worksites where mechanical disturbance occurs
(e.g. trenching, drilling) must have a Manager on site.

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Key Definitions from the Mines Act 1996 [RSBC 1996] CHAPTER 293

"manager" means the person appointed under section 21 to be responsible for the management and operation of a mine;

"mine" includes

(a) a place where mechanical disturbance of the ground or any excavation is made to explore for or to produce coal, mineral bearing substances, placer minerals, rock, limestone, earth, clay, sand or gravel,

(b) all cleared areas, machinery and equipment for use in servicing a mine or for use in connection with a mine and buildings other than bunkhouses, cook houses and related residential facilities,

(c) all activities including exploratory drilling, excavation, processing, concentrating, waste disposal and site reclamation,

(d) closed and abandoned mines, and

(e) a place designated by the chief inspector as a mine;

"mining activity" means any activity related to

Reference: 11"
(a) the exploration and development of a mineral, a placer mineral, coal, sand, gravel or rock, or

(b) the production of a mineral (al, a placer)-5.4(mineral, coal,)-6.3(sandr)]TJ0 -147473 TD.0004 Tc.0

***Safety Guidelines for Mineral Exploration
in Western Canada***

Fourth edition

Health & Safety Committee



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**Safety Guidelines for Mineral Exploration
in Western Canada**

**Health & Safety Committee
Association for Mineral Exploration British Columbia
(AME BC)**

First edition 1982
Second edition 1989
Third edition 2002
Fourth edition 2006 – Reprinted 2007, 2008 (with addenda)

Library and Archives Canada Cataloguing in Publication

**Safety guidelines for mineral exploration in Western Canada / Health &
Safety Committee, Association for Mineral Exploration British Columbia. --
4th ed.**

**Previous eds. published under title: Safety manual : mineral exploration
in Western Canada.**

**Includes bibliographical references.
ISBN 0-9738395-1-1**

**1. Prospecting--Canada, Western--Safety measures. I. Association for
Mineral Exploration British Columbia II. Association for Mineral
Exploration British Columbia. Health & Safety Committee**

TN270.S23 2006 363.1'96221'09712 C2005-907796-4

Disclaimer:

- Amendments to the *Occupational Health and Safety Act*, and the *Occupational Health and Safety Regulation* are on I. Association for Mineral Exploration British Columbia.

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Guidelines for Mineral Exploration in Western Canada. Safety

Gowling Lafleur Henderson LLP www.gowlings.com

Almaden Minerals Ltd. www.almadenminerals.com

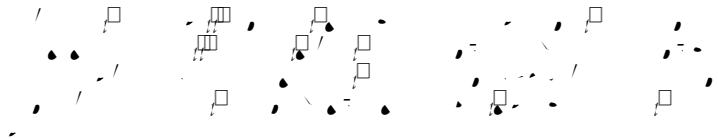
Equity Exploration Consultants Ltd.
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Fraser Milner Casgrain LLP www.fmc-law.com

Hunter Dickinson www.hdgold.com

1984 Enterprises Inc. www.1984inc.com

Rescan Environmental Services Ltd. www.rescan.com



Acknowledgements

These safety guidelines were prepared by the Health & Safety Committee of AME BC (originally the Safety Committee of the BC & Yukon Chamber of Mines).

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Portions of various drafts of editions of the guidelines were critically reviewed by members of the Health & Safety Committee and by the following people whose comments are deeply appreciated:

C.A. Aird, M. Baldry, D.W.S. Barr, S.I. Barr, M. Bartrei, R. Cameron, Bob Cathro, V.A.K. Edwards, A. Eustis, W. Floyd, T. Hall, A. Hoffman, J.T. Lau, John M. Newell, S.S. O'Shea, P.C. Price, A. Randall, L. Ritchie, P. Rowe, R. Stirling, E. Taje, J.H.C. Walker, and G. Woodsworth. Special thanks are due to Karen Eaglestone, K.R. LeDrew, Rhonda Schultz, and Theresa McKee for typing various drafts of previous editions of the manuscript.

The Health & Safety Committee extends special thanks to those who contributed to the 2006 edition of *Health and Safety in the Oil and Gas Industry*. Maureen MacPherson designed the front cover; and Heather Mary Brown drew the safety cartoons, including ones which have previously appeared in *Health and Safety in the Oil and Gas Industry*, and three new cartoons for *Health and Safety in the Oil and Gas Industry*. The Health & Safety Committee thanks Doug Flynn at the Ministry of Energy, Mines and Petroleum Resources for his comments and suggestions; and Dave Barr for reviewing the manuscript.

	Personnel	49
	Hazardous Substances.....	50
	Refuse	50
	Medical Equipment.....	51
	Emergencies.....	51
	Last But Not Least	51
5.	Clothing, Tools, and Equipment	53
	Clothing	53
	Tools and Equipment	53
	Safety Glasses	54
	Hearing Protection	54
	Hard Toe Boots	54
	Hard Hats	55
	Axes and Knives	55
	Rock Hammers	56
	Chainsaw Safety	56
	Training	57
	Personal Safety Equipment.....	57
	Falling Techniques	58
	Operation Safety Guidelines.....	59
	Electrical Equipment	60
6.	Fire Hazards, Firearms, Explosives, and Lighting	63
	Fire Hazards	63
	Fire Officer	63
	Regulations	63
	Firefighting Equipment	63
	Flammable Items and General Fire Protection ...	64
	Heated Tents	65
	Heaters and Water Heaters	65
	Lanterns	66
	Campfires	66
	Tips for Surviving a Hotel Fire	67
	Firearms	68
	Transportation	69
	Camp Use	70

	Field Use	70
	Recreational Use	71
	General Safety Rules	71
Explosives		71
	Transportation	72
	Storage	73
	Destruction	74
Lightning		75
	In Camp	75
	Outdoors	76
7.	Travel and Transportation	79
	Traversing	79
	Clothing and Equipment	79
	General Travel Precautions	80
	Plotting and Executing Traverses	81
	Slippery Surfaces	83
	Crossing Snow Patches	83
	Crossing Creeks	84
	Avoid Panic if Lost or Disabled	85
	Mountain Travel	86
	Special Clothing	86
	Special Equipment for Steep Rock, Snow, and Ice	87
	Slips and Falls	87
	Falling Objects	89
	Glacier Travel	90
	Bad Weather	90
	Medical Problems	91
	Avalanches	92
	Suggested Reading	94
	Boats and Canoes	95
	Preparation	96
	En Route Safety	98
	Ensure Survival	98
	Equipment	98
	Safety Notes	98

8.	International and Long-Distance Travel	135
	Hotel Security	136
	Other Tips	136
	Kidnapping	137
	Hijacking or Hostage Situation	138
	Robbery, Extortion/Bribery, Violent Assault	139
9.	Survival	141
	Be Prepared	141
	Suggested Equipment to Carry	
	In Pockets or Backpack	142
	Don't Panic – The Psychology of Survival	143
	Assisting the Search	143
	Reference Material	144
10.	Wild Animals	147
	Bears	147
	Identification	148
	Habitat	148
	Control Measures	149
	Safety on Trails and Traverses	150
	How to Avoid Bear Encounters-Awareness	151
	What to Do If a Bear Is Encountered	151
	Using a Firearm	153
	If Mauled	154
	For More Information	155
	Moose	155
	Cougars	156
	Rattlesnakes	157
	Bugs	160
	Ticks	160
	Precautions to Undertake in “Tick Season”	161
	Removal of Ticks	161
	After Removal	162
	Mosquitoes	162
	West Nile Virus	163

11.	Underground Workings, Drilling Rigs, & Trenching	165
	Underground Workings	165
	Prior to Entry	165

Chapter 1

Introduction

Safety is prevention of injury when exposed to danger. Most accidents are caused by failure to recognize a potentially dangerous situation and to take the necessary preventive measures. Promotion of safe working practices is the responsibility of all workers, management, and contractors in the mineral exploration industry. Employers and supervisors must provide information, instruction, supervision and enforcement, when necessary, to protect employees' health and safety. It is also the responsibility of each and every employee to do their work

The “workplace” or “work-area” commonly referred to by Workers’ Compensation Boards is unusual and affects safety considerations and safety monitoring. In western Canada, it encompasses over 1,400,000 square kilometres ranging from near desert to alpine environments and temperate to arctic conditions. The unwary could succumb to any one of 20 or more potentially fatal hazards including falls in crevasses or on rough to precipitous ground, avalanches or falling rock; hypothermia; asphyxiation; exposure; drowning; lightning strikes; tree falls; animal or insect attacks, including those by rattlesnakes, wasp stings; and a variety of travel-related causes that include aircraft, motor vehicles and boats.

The seasonal exploration workforce (estimated at 2,700 in BC in 2004) includes many students with little previous wilderness experience, who often work in small isolated groups or alone. The need to develop a self-reliant attitude to safety awareness under such conditions cannot be overemphasized. Personnel must become dedicated to recognizing potential hazards in order to safeguard themselves, fellow employees, and /or those working under their supervision.

A necessary part of safety is possession of knowledge and skills that enable workers to make rapid and effective responses to accidents, to summon more skilled help if needed, and to protect themselves and other workers from hazards.

Health and safety in British Columbia are governed by two agencies, the Workers’ Compensation Board and the BC Ministry of Energy, Mines and Petroleum Resources. For guidelines specific to BC WCB Occupational Health and Safety requirements, the Prevention Manual and amendments are available online at www.worksafebc.com/publications/policies_and_regulations/Prevention_Manual/Default.asp.

The British Columbia WCB Occupational Health and Safety (OHS) Regulation controls reporting of unsafe working conditions to supervisors, corrective measures required to remedy unsafe working conditions following an investigation, and procedures required in respect of an employee’s refusal to work in unsafe conditions. The complete OHS is available online at www.worksafebc.com.

Under the Employment Act, Part 1, an "**employer**" is any person who has one or more persons working for them in or about an industry, through either a hiring contract or an apprenticeship contract. The contract can be written or oral, express or implied.

The BC Ministry of Energy, Mines and Petroleum Resources Health, Safety and Reclamation Code for Mines in British Columbia provides specific guidelines for exploration activities, and is available online at www.em.gov.bc.ca/Mining/Healsafe.

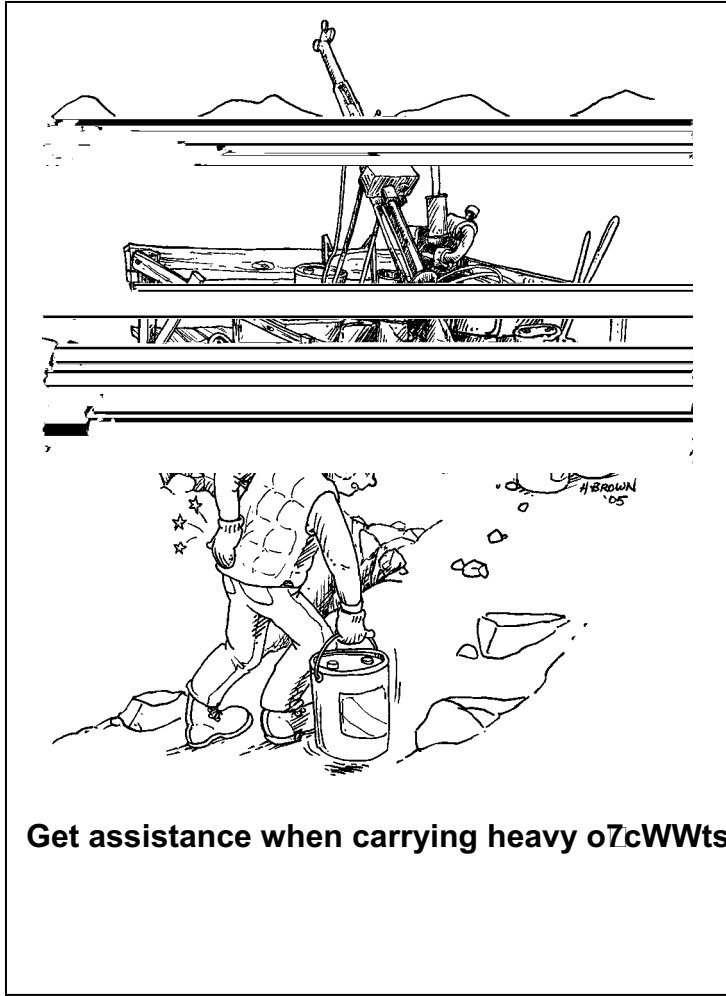
include requirements for better camps and better services. More

company representatives. Positive effects were evidenced by the 1988 safety performance of the companies involved.

In 1982, the BC & Yukon Chamber of Mines initiated an **Exploration Safety Award** presented to all companies reporting a minimum of 800 person hours of annual exploration activity without a lost workday case. By 2004, a total of 408 companies had earned this award, presented in the form of a framed diploma. A total of 634 decals had also been awarded recognizing additional or consecutive years without a lost workday. In 1986, the BC & Yukon Chamber of Mines initiated an **Annual Safety Award**, presented to the company judged to have the most outstanding safety record following a minimum of 10,000 person hours in mineral exploration activity without a lost workday.

- With improved road access to many exploration areas, there is a greater potential for vehicle accidents; however, both fixed-wing and rotary-wing transportation will continue as essential means of transportation for exploration personnel.
- Although unsubstantiated, there is evidence that early exploration personnel suffered fewer lost workday accidents and fatalities because of their self-reliance. Development of this attribute, which could be life-saving, should be encouraged in all personnel.
- Not surprisingly, almost 50% of lost workdays are caused by slips and falls. These data are consistent with mountaineering accidents in Canada and the United States and are a direct reflection of the amount of time personnel are exposed to traversing rough terrain. These statistics are unlikely to change significantly with time, but can be reduced by individuals paying greater attention to ability and fatigue limitations, steep terrain, proper footwear, and the many hazards that can be expected.
- Back-related injuries, which appear to be on an increase, are the third highest cause of lost workday accidents. Most of these accidents are caused by improper lifting or pushing of heavy objects and directly reflect carelessness by the victim who could, as a consequence, suffer a lifelong back problem.
- As a means of maintaining an adequate focus on safety procedures, even the smallest projects should plan safety meetings at least once a week during the field season.

As will be evident to the read



Get assistance when carrying heavy objects:

Chapter 2

Personal Work Methods and Protection

(see also Chapter 5)

Follow safe work procedures and wear Personal Protection Equipment (PPE) to help avoid injury. Review Section 8.2 of the Workers' Compensation Act of British Columbia Occupational Health and Safety Regulation, and Sections 1.8.2 and 9.3.2 of the Health, Safety and Reclamation Code for Mines in British Columbia in Appendix 8.

Eyes

- Wear safety glasses at all times while breaking or hammering rock, core splitting, blasting, using a chainsaw, or when visiting mining operations.
- Wear goggles or a face shield attached to a hard hat when hooking up helicopter sling loads.
- Wear safety glasses or goggles when handling chemicals (e.g.,

aircraft are equipped with sufficient earmuffs to accommodate the maximum number of allowable passengers.

- Air hammers, drilling equipment, muskeg tractors, snowmobiles, and outboard engines also produce ear numbing vibrations – beware and take protective measures.

Hands

- Wear appropriate gloves when handling materials or doing heavy manual labour.
- Do not wear rings, bracelets, or wristwatches when handling materials or working near machinery.
- Cold-weather working and snowmobile driving require insulated mitts specially designed for the job, i.e.:
 - insulated gauntlets for snowmobiling
 - water and fuel-proof insulated gloves for handling fuel and salt
- Wear acid resistant gloves when handling acids or corrosive materials. After handling radioactive materials, wash hands thoroughly with soap and water to prevent ingestion of radioactive particles.
- Wear gloves when handling dynamite, as nitroglycerine may permeate the skin and can cause severe headaches.

Feet

- Wear adequate footwear at all times. Some companies insist that exploration personnel wear safety-toed boots at all times during field work and subsidize their purchase.
- Wear durable hiking boots with Vibram soles when working in rugged terrain. These help support the ankle joints and lessen the frequency of ankle sprains.
- Wear safety-toed boots whenever there is a possibility of heavy objects, such as rock fragments or boulders, falling on the feet.
- Wear safety-toed boots when using an axe or chainsaw (see other precautions in Chapter 5).
- Wear warm insulated boots in cold weather to prevent frost-bite. (Avoid standing on metal in cold weather.)
- Wear waterproof boots in wet conditions.

- Take extra insoles/ boot inserts to replace wet ones and allow them to dry out

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Back

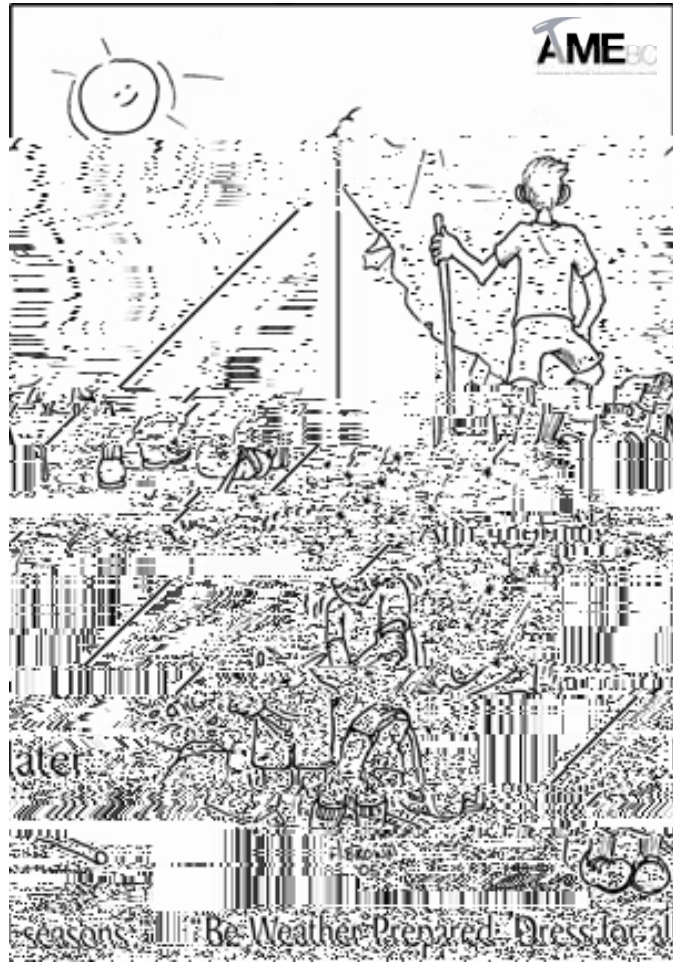
and a mask or respirator should be worn by the operator—as the dust level requires.

- Persons cutting core may be required to have a chest X-ray, as required in regulations for a dust exposure occupation.
- Pay special attention to the storage of radioactive samples, as radon gas is given off by these samples and may become concentrated in poorly ventilated areas.
- If working with X-ray equipment (e.g. XRF analyzer), operators are required by the regulations of the Canadian Nuclear Safety Commission to be equipped with a dosimeter and to file data on exposure.

Other

Depending upon the work environment, certain other personal protective equipment may be required:

- Hard hats if working in areas where there is a hazard from falling objects.
- Protective suits (chemical resistant full body aprons, full length gloves, and full face shield) while handling acids and corrosive materials.
- Adequate clothing to meet the most severe condition likely to be encountered.



reactions and should know what remedial actions may be effective to mitigate distress and symptoms. Numerous highly infectious ailments can disrupt field camps and, once established, may be difficult to control. Extra precau

include a person with Level Three First Aid certification. The

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- *Wilderness Alert*. By Anna Christensen. Wilderness Alert, \$39.95 or \$35.95 depending on size.
- *Outdoor First Aid*. Province of British Columbia. This book has a chapter on from pages 130-146 for general guidance in first aid. \$8.99 from Crown Publications at www.crownpub.bc.ca.

Hypothermia

When heat loss exceeds heat production within the body, hypothermia may develop. Hypothermia is one of the leading causes of death to people in the outdoors; it can develop quickly and it can be fatal. Hypothermia is defined as the cooling of the internal body-core temperature below 35°C (95°F). Below this temperature internal organs – including the brain – do not function effectively. Mild hypothermia is classified as having a core body temperature above 32°C (90°F) and severe hypothermia occurs below 32°C (90°F).

The major difference between the onset of hypothermia on land and in water is one of time scale. Hypothermia on land occurs within 2-9 hours, while in water it can occur within 1-9 hours.

Hypothermia Prevention

Hypothermia can be prevented on land by taking sensible precautions. Use the buddy system to monitor your field partners because victims often do not recognize their own symptoms. If there is the slightest chance that someone is suffering from hypothermia, never leave that person alone or let them wander off as their condition may deteriorate suddenly. Follow these preventive measures:

- Dress appropriately. Always carry extra warm layers and a waterproof outer garment with you. Remember, some types of wet clothing, especially cotton, can extract heat from the body in cold weather much faster than dry clothing, whereas wool and polar fleece garments even though wet, retain a reasonably good insulating quality. An uncovered head can account for up to 60% of body heat loss in cold weather so carry a wool toque or cap. A hood attached to your rain jacket or life jacket is also a valuable aid.
- Carry waterproof matches or a cigarette lighter and some means of easily starting a fire. Build a fire and/or shelter as soon as you feel chilled.
- Stop and rest or bivouac, depending on the severity of conditions, **before** exhaustion occurs.
- Carry extra food, particularly energy producing items containing fats, sugars and starches (e.g., candies, raisins, and nuts). Eat frequently and drink sufficient water to avoid dehydration since the digestion of food requires water.

Hypothermia prevention for boaters is considerably more complex and difficult. In remote areas, to capsize far from shore in cold water is to invite certain death. Boaters should be aware that some lifesaving devices offer little or no thermal protection in cold water. Unless adequate thermal clothing, foam lined life jackets (preferably with a hood and crotch flap) or survival suits are worn, boaters will otherwise rapidly succumb to hypothermia even though safe from drowning. Any decision to swim to shore must be tempered by the fact that the exertion of swimming causes the body to lose heat 35% faster. Experience indicates that in cold water 4°C to 10°C (40°F to 50°F), one can swim only a fraction (1/10 to 1/4) the maximum distance that

one would be capable of swimming in warm water. Body heat can be better preserved by assuming the “Heat Escape Lessening Posture”

- Slight incoordination: some difficulty performing tasks with fingers and hands
- **Moderate stages** – A victim of moderate hypothermia is in grave danger and may die if hypothermia progresses.
 - Increased incoordination and clumsiness
 - Fatigue—wants to rest or go to sleep
 - Reduced shivering
 - Slurred speech and amnesia
 - Weakness and drowsiness
 - Apathy and poor judgment
 - Dehydration
 - **A victim stumbles frequently, is uncooperative and confused, and may wish to be left alone.**
- **Severe stages**
 - Shivering diminishes and then stops
 - Inappropriate behaviour such as removing clothing
 - Speech is slurred
 - Reduced heart and respiratory rate, depressed brain function,
 - Irregular pulse (cardiac arrhythmia)
 - Muscle rigidity
 - Unconsciousness
 - Cardiac arrest occurs when the body core temperature cools below 30°C (86°F).

Treatment

Take immediate action to **PREVENT FURTHER HEAT LOSS.**

- Get the victim into some sort of shelter. If there is no outdoor shelter, use whatever is available—a tent, an overturned canoe, a space blanket or tarp, branches rocks or snow for a windbreak. Build a fire as soon as possible.
- Remove wet clothes gently without exposing bare skin to wind or rain, if possible. Share dry clothing to the extent that no other member of the party is endangered.
- Use blankets or sleeping bags to insulate the body against further heat loss.

•

Treatment: cool the victim. Rest in a cool, shaded place with legs slightly raised and clothing loosened. A conscious victim should drink an electrolyte replacement solution to replace the water and electrolytes lost by dehydration. 24 hours of rest and rehydration are necessary before resuming work.

- **Heatstroke** is a **life-threatening condition** demanding **immediate medical attention**. As the body core temperature approaches 41°C (105.8°F) the victim can no longer produce sweat. There are two forms of heat stroke: **Exertional Heat Stroke** (which more commonly affects field employees) and **Classic Heat Stroke**.

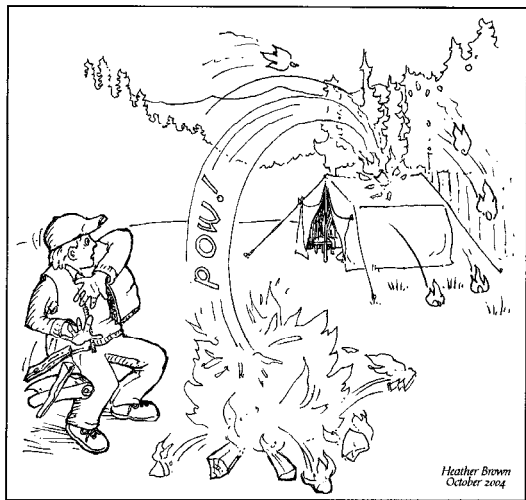
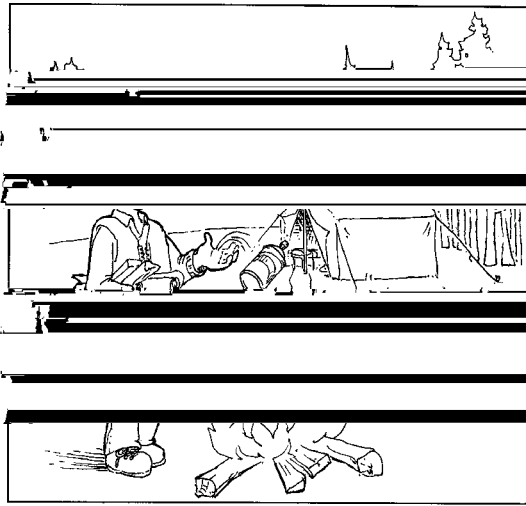
Symptoms:

Exertional Heat Stroke	Classic Heat Stroke
Pale, cool, damp skin	Hot, dry, red skin
Hot, dry, red skin	Rapidly rising core temperature
Irrational hostile behaviour	Rapid pulse
Rapidly rising core temperature	Headache
Headache, dizziness	Nausea and vomiting
Nausea and vomiting	Delirium
Collapse	Convulsions
	Collapse and coma

If any heatstroke symptoms are apparent, treatment for heatstroke must begin without delay. As the core temperature rises above 41°C (105.8°F), unconsciousness, delirium and convulsions may occur.

Interim Treatment – prior to evacuation to a medical centre.

1. Move victim out of the sun into the coolest possible place.
2. Cool the victim as quickly as possible, paying particular attention to the head, armpits and groin. Drape the victim with lukewarm wet sheets or towels to conduct heat away from the body.
3. Fan the body using electric or handheld fans. Try to place the victim on a screen so they can be cooled both from above and below. The aim is to maximize evaporation from the body to cool the core body temperature—without chilling the victim.



DO NOT DISPOSE OF AEROSOL CANS IN A FIRE!!



Chapter 4

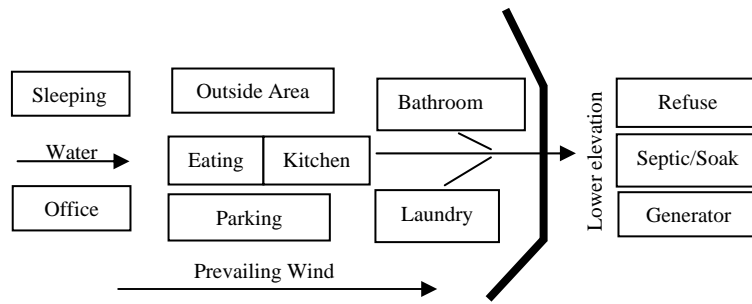
Camp Management

It is extremely important for the camp manager and/or party chief to be safety conscious. The party chief's attitude and actions set the tone for the rest of the crew. Failure to recognize and prevent hazards may in some circumstances leave the manager liable as per Section 117 (1) (2) of the Workers' Compensation Act of BC. Camp safety is a matter of common sense combined with adequate preparation. The following "checklist" is probably not complete, and should be considered merely **as a guide to the types of hazards** that are present in locating, designing, and running a small to moderate size camp in the bush. See requirements in 9.12.1 of the Health, Safety and Reclamation Code for Mines in British Columbia in Appendix 8.

Location and Layout

Camps should be constructed:

- In a safe location removed from environmental threats such as avalanche, flood, falling trees, animal trails, aircraft take-off/landing/operation paths, etc.
- To have minimum environmental impact.
- With camp structures located at minimum safe distances apart (at least 6 metres) to prevent spread of fire and within an area protected by a fire break.
- With an emergency tent/building far enough removed so that it can act as a separate shelter if the rest of the camp is destroyed. This tent must have 3 days of emergency rations.
- According to the principles shown in the general layout on the following page. Locate tents in a straight line. It is important **not** to arrange tents in a circle, so that if a bear must be shot, no one is in the way of fire by being in their tent.



Consider the following:

-

- Burn garbage in a safe open area away from camp (at least 100 metres away and visible from a distance so as not to surprise bears).

- Have a water pump and hose ready to go located at water source closest to the sleeping, eating and office tents.

Firearms (see also Chapter 6)

Firearm laws and regulations vary from province to province, state to state, country to country, and under local ordinance legislation.

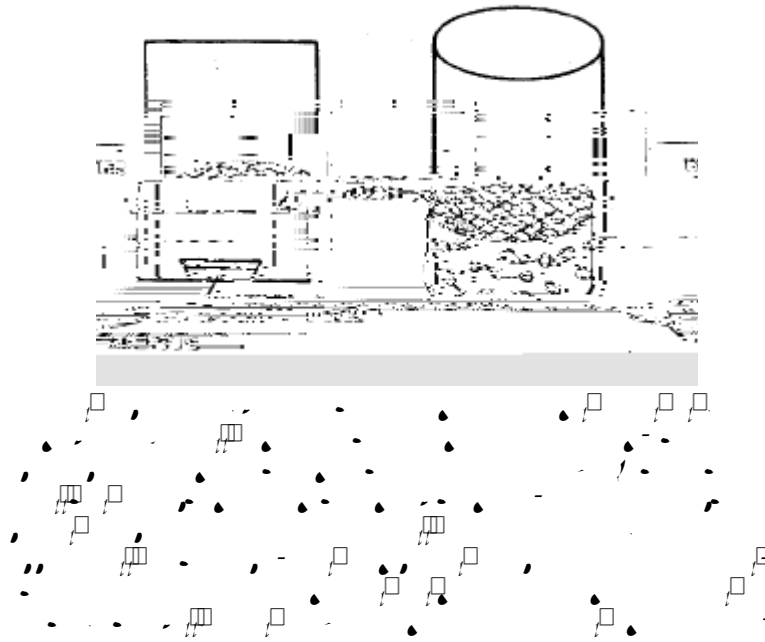
- Know and comply with the general firearm laws policy.
- Find out about areas where it is necessary to use firearms for protection against bears and other predatory animals.
- Firearms and any ammunition must be stored in a secure, safe place in camp, under supervision of the safety coordinator or a certified person.
- If the camp is in an area with large predatory animals, know how to use the firearm(s) for protection.
- Each camp in which firearms are permitted will have firearm safety systems. Know and adhere to these.

Sanitation and Hygiene

Sanitation facilities must comply with all applicable legislation.

-

- Dry and packaged food should be stored in clean, insect and animal free conditions. Perishables and frozen foods should be stored in cool or frozen conditions.



For a fly camp of less than one week duration it is probably sufficient to wash and flatten tin cans and store them in an airtight garbage bag. The garbage bag can be returned to the main camp or town for incineration and burial.

- A suitable size of firearm should be kept in base camp for use as a last resort to protect life or property. Current gun legislation must be followed.
- Bear spray is an additional defense available.
- Problem animals should be reported to local wildlife authorities. If an animal is shot it is a legal responsibility in most areas to turn in certain portions of the remains to wildlife authorities for recording.

Animal, Insect, and Disease Control

Animal, insect and disease can be attracted to camps and make them uncomfortable, unsafe, or unhealthy.

- Do not feed or attract wild animals, or bring them to camp.
- Do not alarm or provoke animals that do appear in camp.
- Insects should be kept out of camp buildings using screens and/or the mildest effective repellants/poisons (use only as directed).

Cleanliness, tidiness, and proper refuse/waste disposal will minimize insect invasion and disease. (No food in sleeping/office/tents).

Communications

See Section 3.2.3 of the Health, Safety and Reclamation Code for Mines in British Columbia and Section 4.21 of the Workers' Compensation Act of British Columbia Occupational Health and Safety Regulation in Appendix 8 regarding communications when a worker is working alone.

- Each camp should have a reliable means of communication (radio, phone/fax), and at least one daily contact with the site head office via the camp manager.
- It should be the responsibility of all employees to know where the communication equipment is, know how to operate it, and to know regular schedules.
- Each camp should maintain at a minimum weekly contact with head office.
- In remote areas, dependable radio communication and backup both between camps and between camp and aircraft is essential.
- Radios should meet requirements of transmission distances and conditions of use.
- Handheld FM radios require regular battery charging. Backup batteries should be carried in the field.
- Radio frequencies used should allow communication with outside camps or other outside contacts. In some areas (e.g. Yukon), there is a common frequency used by industry over which help can readily be obtained.

- Antennas and lead-ins should be well flagged to avoid entanglement with aircraft, vehicles or people, and should not be located on potential flight paths.
- Radiotelephones and satellite telephones require clear lines of sight to repeaters or satellites. Camps should not be in closed valleys if possible to minimize the restrictions on communications. A generator is necessary to recharge batteries.
- Establish radio or other contact with local expeditors, RCMP, forestry, or other officials so that your timetable and whereabouts are known locally.
- If a badly injured member of your crew needs medical evacuation you should know:
 - Who to telephone for a medevac
 - Location of nearest medical facility to which evacuation would proceed
 - Who to contact for medical advice and to advise of your arrival
 - Location of nearest available fixed-wing or helicopter aircraft, and how to contact these quickly in an emergency (see Appendix 7)
- Should seriously injured or sick individuals require medevac transfer in British Columbia, contact should be made immediately with the British Columbia Ambulance Services (BCAS) Provincial Dispatch by telephoning 1-800-561-8011. BCAS coordinates air and land transfers of sick or injured individuals requiring transfer from one area to another. As BCAS receives 30 to 40 emergency calls daily, the following information should be available when the request for assistance is placed:
 - Available history of injured or sick individual, including name, home address, and date of birth
 - Specific grid reference for emergency aircraft required to transfer the victim
 - Description of injury and/or sickness
- An emergency call list of the nearest medical facility, RCMP, government officials and air transportation facility should be kept at each communication station.

- All crew members at each location should know how to operate all communications equipment.

Personnel

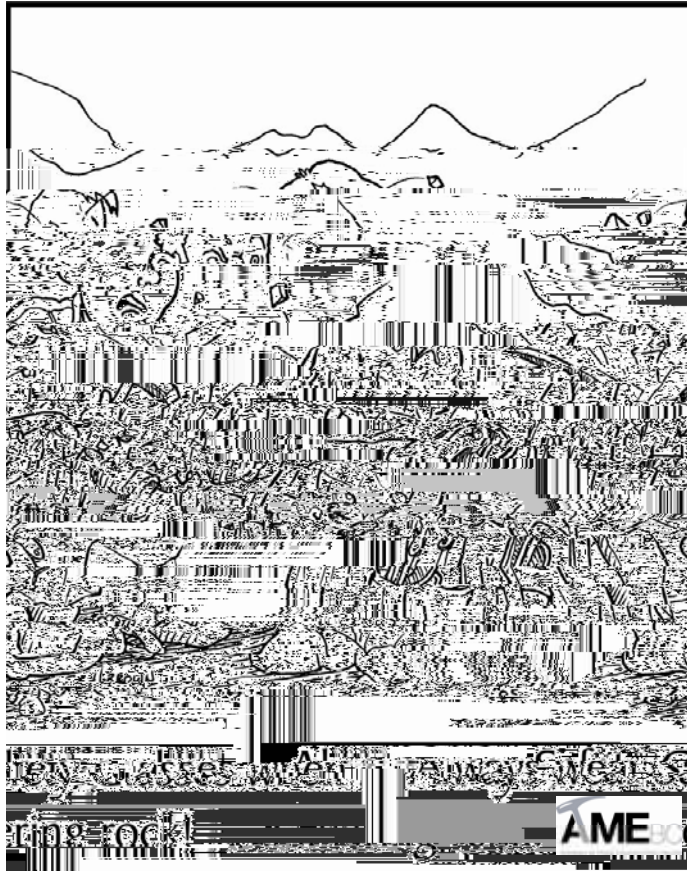
- Is the crew aware of the safe procedures for operation of any equipment that they use or work around? (see Chapter 5 and Appendix 4)
- Is appropriate personal protective clothing being worn (i.e., boots, goggles, gloves, etc.)? (see Chapter 2)
- Is the crew advised on the proper course of action if lost or if, through circumstances, they must spend an unexpected night or nights out? (see Chapter 9)
- Do individuals carry suitable clothing and safety gear in case the above occurs (e.g. signal mirror, signal cloth, matches, etc.)? (see Chapter 5; Appendix 5)
- Working in pairs is safer than working alone and should be mandatory when working in dangerous areas or when one of the individuals is inexperienced. It is the responsibility of the party chief to evaluate the hazards of working alone against the experience of the individuals concerned (see Chapter 7)
- Individuals who carry firearms must be licensed and proficient in their safe use (see Chapter 6)
- A member of the crew, preferably the party chief or a dedicated Occupational First Aid attendant, must have a knowledge of first aid, and be backed up by a suitable first aid kit and manual (see Chapter 3)
- All crew members should carry a personal medical kit and it is recommended unless already stipulated by legislation that all members of the crew have first aid training and/or wilderness survival training.
- Are you, as a manager, aware of the medical condition of each member of your crew (e.g. allergic reaction to insect stings, etc.)? (see Chapter 3)

Medical Equipment

Each camp must have first aid kits according to the WCB regulatory policies of the area and Section 9.3.1(1) of the Code (see Appendix 8).

Each camp should have a more comprehensive medical treatment kit. Designated person is responsible for administering emergency medical treatment and maintaining medical treatment supplies and equipment.

- It should be each worker's responsibility to know where the first aid kits and medical treatment kits are, who the camp First Aid



Chapter 5

Clothing, Tools, and Equipment

Clothing

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- Always wear a hat (in winter this should be a toque or preferably a 100% wool peaked hat with ear-flaps). Sixty per cent of body heat is lost through the top of an uncovered head.
- In winter, the best outer garment is a long thigh-length parka with hood and bottom draw string. A full fur-trimmed hood will protect the face. Mittens protect the fingers better and are much warmer than fingered gloves. Attach mitts to tape threaded through arms of jacket to prevent loss. Leather mittens with wool liners are the best and should be tightly closed at the wrist. Insulated half rubber-half leather boots with insoles (two pairs if extremely cold) that are warm and waterproof are essential.

Tools and Equipment

Requirements for personal protective equipment on a mine property are specified in Section 1.8.1 of the Health, Safety and Reclamation Code for Mines in British Columbia (the Code; see Appendix 8).

Before using tools and equipment, ensure that you are familiar with operating requirements. Provide adequate instructions to those who have not had experience with equipment:

- Explain the function of the equipment and warn of possible dangers.
- Demonstrate correct operating procedure.
- Check out the trainee.

Safety Glasses

Under the Code, any person who may be exposed to specified risks of eye injury must wear properly fitting goggles, face shields or other eye protective equipment complying with the current CSA Standard for “Industrial Eye and Face Protectors” and suitable for the type of work of activity being performed. Safety glasses should be used in rock sampling, core splitting, and tool grinding. Many companies bear the cost of prescription safety glasses for their field crews (see Chapter 5).

Hearing Protection

In exploration, the need for hearing protection is rare. Most frequent use is in helicopters equipped with earphones, which facilitate

communication between pilot and passengers and reduce fatigue and motion sickness (see Chapter 2). Hearing protection is also required when using chain saws or rock saws, around drill rigs, or when loading aircraft.

Hard Toe Boots

Under the Code, protective footwear complying with the current CSA Standard for “Protective Footwear” and suitable for the type of work or activity being performed must be worn by any person where there is a risk of foot injury or where required by a manager or a mines inspector. In exploration, hard-toe work boots should be worn during rock excavation work and around underground workings. Several companies require that exploration personnel wear safety-toe boots during traverses and some provide an allowance toward purchase.

Hard Hats

Under the Code, a protective hat complying with the relevant requirements of the current CSA Standard for “Industrial Protective Headgear” and suitable for the type of work or activity being performed must be worn by any person who is exposed to risk of head injury or where required by a manager or mines inspector. Hard hats should be worn on appropriate occasions, particularly in quarries, underground workings, and on exploration work around cliffs, icefalls and diamond drills. Hard hats can embrittle and should consequently be tested after 3 to 5 years of use to ensure that they provide adequate protection and comply with current systems. Painted hard hats should be avoided as some paints can combine with solvents in the hat and either soften or embrittle the material. Hard hat liners should be replaced annually if in frequent use.

Axes and Knives

All axes should have a blade protector or sheath during transportation, as should hunting knives. When carrying an unprotected axe in the bush, hold handle immediately below the head with the blade facing outward for maximum protection in the event of a fall. The best knife for use in the bush is one having a steel shank extending to the butt end of the handle.

- **Axes**

- Choose a long-handled axe and keep it sharp. The long handle will allow the axe to hit the ground, not your leg. A sharp axe will reduce the work required thereby reducing fatigue and fatigue-induced accidents. As a general guide, the weight of the axe head should be matched to the weight of the handle, e.g., a 2.5-pound head to a 26 inch (66 cm) handle, or a 3.0-pound head to a 32 inch (81 cm) handle.
- Always hold the axe with both hands.
- Clear the work area of obstructions.
- Ensure axe head and handle are secure. This will prevent “fly off” type accidents. Soak axe head area in water overnight and insert new wedges as required.
- Ensure good footing while chopping.
- Maintain a firm grip on the handle.
- Maintain an even temper. If you “fly off the handle” the axe may end up in your leg.
- Wear boots with steel-protected toes.

Rock Hammers

There are several potential hazards to users and bystanders when rock hammering is in progress.

- Eye injury to anyone in the vicinity may be caused by flying rock or metal chips. Therefore, eye protection must be worn.
- Hammer heads could fly off the handle. Before use, inspect the hammer to ensure the head is secure.
- Ensure swing area is clear of shrubs or twigs which might deflect off the hammer.
- Use care when carrying the hammer. Injuries have been sustained by people falling on the sharp end of their rock hammers.

Chainsaw Safety

Training

The most important aspect of chainsaw safety is the formation of good working habits and familiarity with the equipment. This requires a training program by a qualified instructor. The operator should have a good working knowledge of the function of the power saw and the ability to make minor adjustments and repairs in the field. Physical fitness also results in a more alert approach to the job and the worker is less likely to develop lazy cutting habits, the cause of many accidents.

Personal Safety Equipment

All operators must wear adequate protective equipment while operating a power saw. This includes:

- **Leg Protection**

Available in short chaps with interwoven nylon pads protecting the leg from 30 cm (12 inches) above the knee to 30 cm below the knee for a person of average height. However, those people of above average height will find that these chaps provide only about 5 to 8 cm (2 to 3 inches) of protection below the knee thus leaving the shins vulnerable to injury if worn with ordinary hiking boots. Also available are professional faller's pants with built-in pads which provide considerably greater protection and are much more comfortable.

- **Headgear**

A lightweight plastic hard hat is required to prevent serious injury from falling debris. Headgear should be of bright colour for easy visibility.

- **Ear Protection**

Two types of adequate protection are available and highly recommended for use. A "muff type" protector that clips onto the hard hat is useful during cooler weather while "insert plugs" may be more comfortable and equally effective during warmer weather.

- **Eye Protection**

Adequate protection against eye injuries is available in three basic styles:

- A face shield that clips onto a hard hat, and is composed of either fine mesh screen, clear safety **glass or plastic**, offers good visibility and air circulation.
- Plastic goggles that fit snugly to the face are effective but become fogged and uncomfortable in warm weather.
- Hard plastic or glass safety glasses.

- **Footwear**

Wear good Vibram-soled leather boots at all times for best possible footing during dry periods. In extremely wet, timbered areas leather or rubber caulk boots are recommended – particularly on the West Coast, the Queen Charlottes, and Vancouver Island. Caulk boots should not be worn on exposed rock surfaces because of the danger of slipping.

- **Gloves**




Appropriate chainsaw gloves are inexpensive lightweight nylon gloves with latex webbing that permit a sure non-slip grip on the power saw especially in wet weather.

Falling Techniques

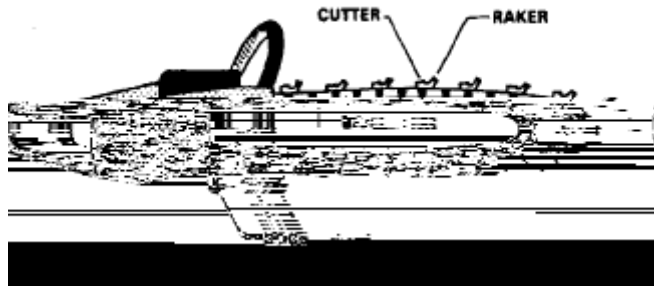
There are six fundamental steps to follow in falling timber.

1. Accurately judge the lean of the tree.
2. Plan a retreat route.
3. Clear the ground surrounding the tree and along the escape route.
4. Always look above for falling debris.
5. Take special care in making a proper undercut and leave an adequate hinge of wood to maintain control of falling direction.
6. Ensure that no one is in the immediate area and/or that they are aware of your activity.

Operation Safety Guidelines

The Workers' Compensation Board of British Columbia supplies a "Chainsaw Safety" brochure and  (which replaces the , ). "Chainsaw Safety" is available for download from www.worksafebc.com and is also available from AME BC free of charge.

The most common injury related to chainsaw operation is kickback. This occurs when the operator momentarily loses control of the saw, resulting in the blade bouncing back off the log into the operator's neck, face or leg. Kickback can be avoided by not working in an awkward position; i.e. standing too far away, working off balance, or working with poor footing. Proper care must also be taken while cutting branches, brush, or windfall slightly above ground level, where hidden obstructions on the opposite side of the log may cause the tip of the bar to kickback through the cut.



- Keep the chain bar to the rear while carrying the saw. If you trip, you won't fall on top of the chain. In addition, the dogs and the bar won't get caught up in the brush.
- Shut off motor when carrying the saw any distance.
- Hold saw firmly against body when using the tip of the bar to reduce impact from kickbacks.
- When cutting limbs, remember that the end of the bar causes most kickbacks.
- Learn to use the saw equally well with the right and the left hand to avoid awkward positioning.
- Never stand directly behind the saw and never straddle the saw. Always work to one side to minimize injury from potential kickbacks.
- When cutting in heavy windfall, assess each tree for stress – make a shallow cut on four sides to relieve tension before completing the final cut.
- Carry a portable first aid kit containing Band-Aids and at least one four-inch pressure bandage with ties.

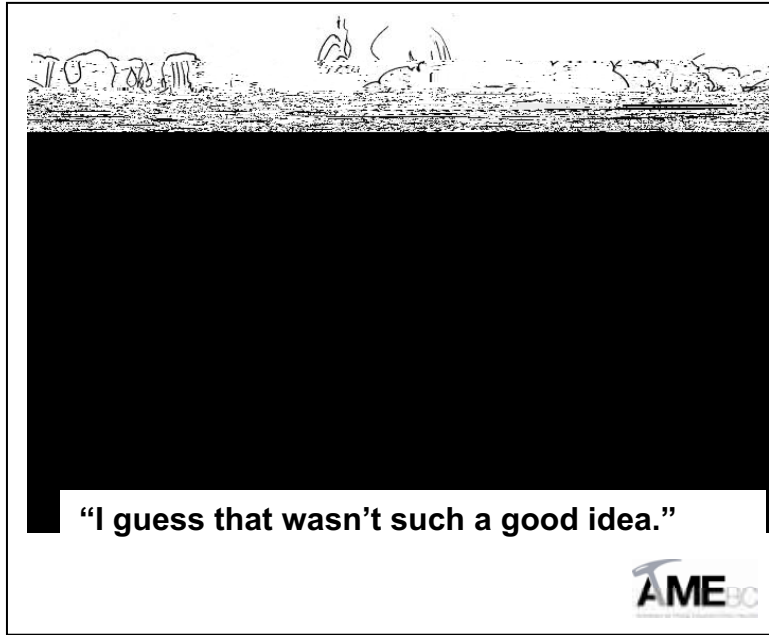
Electrical Equipment

Observe adequate precautions with electrical equipment and remember that fatal accidents have occurred because of the operator being inadequately insulated from electrical shock. Use only CSA-approved or double insulated types of electric tools. Follow the regulation in Section 19.10 of the Workers' Compensation Act of British Columbia Occupational Health and Safety Regulation.

When **generators** are used as a source of power in the field, grounding of this equipment is very important. A fused breaker-box must be used for all circuits to ensure any shorts will immediately shut off the current. A ground wire should be carried in all circuits and electrical boxes should be grounded in tents. When establishing a large camp an electrician should be involved in the design and construction of the system.

An **electrically powered rock saw** is an example of a potentially dangerous situation where water can accumulate under the operator while using the saw. This equipment must be carefully grounded and

you should stand on a wooden platform so water will not collect at your feet.



Chapter 6

Fire Hazards, Firearms, Explosives, and Lightning

Fire Hazards

There are two key elements to fire safety:

- Prevention
- Early action with pre-positioned equipment and an established plan

Fire Officer

Be constructively aware of fire safety. In a large camp, it is good practice to appoint one or more mature persons to be responsible for the implementation of fire safety measures.

- The safety officer or designee should establish procedures (and equipment deployment) for various types of fire occurrences, and advise all other personnel of them. Hold periodic fire drills.

Regulations

See Section 3.9.1 of the Health, Safety and Reclamation Code for Mines in British Columbia in Appendix 8.

- Consult the fire regulations in the jurisdiction where you will be working (provincial or territorial) for the type and quantities of fire equipment that are required for the main camp and for each subsidiary camp.
- Study the regulations carefully; they constitute a manual of good fire prevention practice.
- Check annually for any changes.

Firefighting Equipment

- Maintain the general camp fire equipment at one location. Have it painted red, and ensure that it is not used for any other purpose.
- Keep additional equipment where it is most likely to be needed.
 - Appropriate 4-kilogram ABC fire extinguishers should be placed in, or adjacent to, each tent.

- A large container (45-gallon drum) of water located near each tent in addition to a water bucket and sand bucket guarantees operational firefighting capability.
- An adequate extinguisher should be maintained at each fueling point, such as for vehicles, power saws, or pumps.
- A reservoir should be available from which water can be drawn by pump or bucket line.

•

Heated Tents

Care should be taken with heated tents.

- Ensure that chimneys are adequately insulated from the tent wall with fire retardant material, metal inserts, or tin cans.
- Use non-clogging spark arresters on both oil and wood stoves.
- Use aluminum foil reflectors to ensure that radiant heat from the stove or pipe does not set fire to the canvas or wooden tent walls.
- An outside pole that is used to support the stove pipe should be shorter than the top of the pipe and should be separated from the pipe by a flattened tin can.
- Ensure that stove pipes are adequately wired and braced to resist wind storms.
- Separate the tents adequately to prevent the spread of fires.
- Place metal safety guards around all oil heaters.
- Place metal base plate under heaters.

Heaters and Water Heaters

Airtight heaters should have a thin layer of sand or sandy soil spread on the bottom to prevent metal from being burnt through.

- Space heaters and water heaters should be placed on metal stands and have clearance from flammable surfaces as specified by the

- Avoid starting wood fires with flammable liquids. Plan ahead and purchase solid-fuel fire starter if you intend to use wood fires.
- Never pour a flammable liquid into any stove, or into a fire area that is still warm; the immediate fuming of the liquid will result in an explosive vapour. In the event that a flammable liquid is used to start a fire, ensure that it is “contained” in an absorbent material (e.g. absorbent paper) so as to reduce fuming.
- When starting a wood stove, a small piece of burning paper placed directly under the stove pipe creates a column of heated air in the pipe, so that when the tinder and kindling are lighted, there is already a favourable draft.
- Build fires from “small to large”. Get the tinder, kindling, and small wood burning before piling on large pieces.

Lanterns

Lanterns and stoves require particular caution.

- Lanterns should be hung up so that they are not easily dislodged.
- The handle of a lantern that is hung up while lit will become dangerously hot; use caution in taking the lantern down.
- Lanterns should be taken down for lighting so that they can readily be taken out of doors in case of accident.
- Before lighting a lantern, think of where you will take it, and how you will carry it (such as with a stick through the handle) if it flares up because of a gasoline leak. Alternatively, light it outdoors.
- Fill pressure tanks only to the recommended level.
- Do not pump in excessive pressure.
- Ensure that radiant or convective heat from a lantern does not set fire to the wall or ceiling of a tent.
- Do not leave lit lanterns unattended.

Campfires

- Use care and foresight when choosing the location of a campfire or signal fire to ensure that it does not spread into trees or forest litter.
- Clear the immediate fire area down to mineral soil.

- For a campfire, it is advisable to use a small fire pit. Square-faced stones built up to form a wall about two feet high on the back of the fire pit will help reflect heat to the front.
- For a small signal fire, it may be convenient to use a large flat rock.
- Use particular care in extinguishing camp and signal fires. Extinguish with ample water wherever possible; a plastic sample bag is useful for carrying water for this purpose in the field.
- Check the ashes carefully and test for hot spots with your bare hand.
- Avoid scattering of signal fire ashes by helicopter blade wash.

Tips for Surviving a Hotel Fire

With improved transportation facilities, exploration personnel are commonly accommodated in hotels or motels near work areas. Hotel and motel fires kill hundreds of occupants each year. Experience shows that fatal fires occur in first-class hotels and large motel chains – fires are not restricted to older, rundown buildings. Careless smoking is the greatest single cause. Arson is responsible for almost 20% of hotel fires. It is therefore important to be ready for a fire and to know what to do should it occur.

- **At Check-In**
Ask:
 - For a room on no higher than third floor if possible.
 - How guests are notified of fire.
- **Escape Plan**
Immediately after check-in:
 - Locate the nearest exit and fire alarm, and then find an alternate exit.
 - Count doors to exit.
 - Note hallway obstacles.
 - Does the window open? If not, how would you break it?
 - Keep key, small flashlight, and eyeglasses on nightstand.

- **Escape Action**
 - Grab room key, flashlight, and spectacles.
 - If room is smoky, crawl to door.
 - If cool, open door slowly. If hot, stay put.
 - Crawl to stairs, hugging wall on exit side.
 - Walk down to ground floor; hang onto railing.
 - If smoke “stacks” in stairs, walk up to the roof, prop open the door, stay put.
 - **DO NOT USE ELEVATOR.**

- **Room Survival**
 - Stay in your room if the door is hot and the hallway smoky.
 - Try to phone desk.
 - Fill tub with water, turn on bathroom vent.
 - Use an ice bucket or trash can to bail water on hot doors and walls.
 - Stuff wet sheets or towels around door and vents.
 - Tie wet towel around your nose and mouth.
 - If smoke fills the room, open the window (break as **last**

permit issued in British Columbia will not be valid in Yukon. Check with the local RCMP detachment.

Weapons should be adequately protected in transport. Sights are easily damaged and alignment should be checked for possible blockage by packing material.

Camp Use

Ensure that proper ammunition is provided and keep the firearm and ammunition together under lock and key. It is embarrassing to be unable to locate both items in time of need and frustrating to find that they do not match one another.

If the camp is to be unattended, remove the firearm to a nearby location so that you will not return and find a bear and the gun in the same place.

Avoid firing at bears in the camp area unless mauling is in progress. It is difficult to be sure of the whereabouts of every crew member; equipment may be damaged; and having a dead bear in the campsite creates an awkward disposal problem. Avoid firing in inadequate light as chances of hitting a vital spot are reduced and a wounded bear may result. Do not use an inadequate weapon.

Field Use

Be aware that rifles and shotguns are awkward to carry in combination with day packs, rock hammers, ge

Recreational Use

Columbia Occupational Health and Safety Regulation (see Appendix 8 for details).

This section is only concerned with the transportation, storage and destruction of explosives as related to mineral exploration. No attempt is made to discuss the use of explosives, as all blasting operations must be conducted by the holder of a valid blasting certificate issued under the Code. More detailed information is available free of charge from WCB at www.worksafebc.com. Further guidelines are in the Natural Resources Canada publication, *Explosives Safety Handbook*, available from Natural Resources Canada at Suite 101, 605 Robson Street, Vancouver BC V6B 5J3, Tel.: 604-666-0366. Highly recommended is the Commercial Explosives Course offered by the British Columbia Safety Council, although competency is achieved only by working closely with an experienced blaster. All blasting operations associated with exploration or mining activities must be discussed with the Mines Inspector and approved under the *Explosives Safety Handbook*, prior to commencement. Adequate warning signs must be placed in the vicinity of blasting operations and access routes must be guarded. Ensure that all personnel on site have been oriented to blasting warning protocols.

Transportation

Transportation of explosives requires a vehicle in **good** mechanical condition accompanied by an authorization from the owner to use the vehicle for this purpose. Fire extinguishers must be carried with the vehicle: two 5 BC rating fire extinguisher for a vehicle with a gross weight of up to 2,000 kilograms; and two 10 BC rating fire extinguishers for a vehicle of more than 2,000 kilograms. If the amount transported exceeds 25 kilograms, the vehicle must display “explosives” signs on all four sides.

Some insurance policies exclude carriage of explosives without payment of an additional premium.

Absolutely no smoking is permit

Explosives must be transported in a fully enclosed, locked, fire resistant van, tank or fixed container:

- Standard panel truck (van) with lockable doors and compartments.
- Aluminum, fiberglass, or wood camper-top secured over pickup truck with a suitable lock.
- Fixed container with lockable lid, made of 2-inch dressed lumber or ¾ inch plywood.
- For small quantities, the trunk and glove compartments of a car emptied of all loose objects.
- **If both explosives and blasting caps are being carried,** a separate lockable comp

secured for storage purposes at night. The Mines Inspector has the authority to make judgment decisions to allow for flexibility of the magazine standards.

The following items may be stored within an explosives magazine:

- explosives
- blasting agents
- detonating cord
- primers and boosters

N.B.: Detonating caps, safety fuse assemblies, delays and relays must be stored within a separate magazine at a minimum distance of 50 metres from the explosives.

Destruction

DISCLAIMER – REFER TO REGULATIONS.
Only a certified blaster should attempt to destroy explosives as per requirements. Confirm approval with the mines inspector of where you conduct exploration.

It is necessary to destroy explosives that have deteriorated through exposure to excessive moisture, heat, and prolonged storage since decomposition causes misfires and instability. Explosives that have absorbed moisture are usually soft and mushy while heat will cause gelatin-type explosives to “sweat” (i.e. ooze out clear oily beads of nitroglycerine). Remove and transport the explosives to the desired location for destruction.

There are two common methods of destroying high explosives: by detonation or by burning. Detonation is the quickest method, but if the explosives are badly deteriorated, some cartridges may fail to detonate and would hence be scattered around by the explosion of others.

The most efficient method is by burning, although burning of more than 50 kilograms at one time is not recommended. The choice of location should be such that surrounding property and lives will not be endangered in the event of the explosives detonating instead of burning.

- Prepare a combustible bed of dry material sufficiently long so that the cartridges may be spread out without overlapping.
- Douse the bed with kerosene to assist the burning.
- Prepare an ignition trail leading to the combustible bed so that ignition will be against the wind direction.
- Ignite the trail and stay clear of the area until the fire is completely burned out.
- Sift ashes with a wooden rake to ensure all explosives were burned.
- If additional quantities must be destroyed, use a new location.

Outdoors

During a lightning storm:

- Avoid standing in areas that are susceptible to a strike, e.g. a single large tree, a mountain ridge, or a large open area where you are the only tall object.
- Move to a safe place before the storm arrives, such as inside a car or truck. Look for shrubs or trees of uniform height, ditches, trenches, or low ground.
- If fallen live wires are touching the vehicle, do not step onto the ground while they are touching the vehicle; you are a better conductor than the tires.
- Head for shore immediately if you are in a boat or canoe.
- Geophysical crews must be especially alert for storms in their area as equipment may stretch for kilometers. Disconnect all wires from equipment and stay well clear for the duration of a storm.
- Choose a campsite where the possibility of lightning strikes is minimal.
- Maintain high awareness for thirty minutes after the last observed lightning or thunder.

If lightning strikes in the vicinity, you must minimize your contact with the ground.

- **Crouch** down with your knees drawn up and your feet together. **Crouch** on insulating material if possible, such as a dry sleeping bag. Never let your hands, shoulders or head touch the ground, as current passing through them will also pass through your vital organs.
- A field party should spread out at least 20 metres apart so they do not provide multiple paths for the current.

If a person is struck by lightning, check if the victim has a pulse and is breathing. Follow the ABCs of first aid.

- **Airway- check**
- **Breathing – respiration rate**
- **Circulation - CPR**

Treat burns as required. Aftereffects may include impaired eyesight and loss of hearing.

Note:

- **You cannot receive an electrical shock from someone who has been struck by lightning.**
- **Lightning rarely kills outright—it paralyzes body functions. Recovery is common, even if some time has elapsed since the strike.**

The National Lightning Safety Institute (NLSI) recommends that all organizations prepare a Lightning Safety Plan and inform all personnel of its contents. Visit the NLSI website at www.lightningsafety.com. A useful outline of a lightning safety decision tree is at www.lightningsafety.com/nlsi_pls/decision_tree_people.html.

- Consider carrying other emergency equipment such as a space blanket, candle (for lighting fires), signal flares (see other sections on survival, survival equipment and clothing).
- Matches should be in a waterproof container – do not become separated from your matches (e.g. by leaving them in a packsack). (See also Chapter 5 and Appendix 5.)
- Individual First Aid kits with antihistamine and/or EpiPens should be carried. EpiPens are used for injecting adrenalin to counteract allergic reactions.

General Traversing Precautions

- Traverse in pairs, preferably with at least one experienced person, or within communication distance (use hand-held radios between groups). Employ the “buddy system” where each person looks out for each other.
- The less experienced person should be learning, not just following; the experienced person should be teaching.
- Travel at the speed of the slowest party member.
- If it is necessary to travel alone, use greater caution. Even a minor mishap may be fatal if there is no one to come to your assistance promptly.
- Avoid following too close to a person ahead of you to prevent branches from springing back into your face or being stung if the lead person stirs up a wasp nest.
- Inform others of your travel plan, or (if there is no one immediately available) leave a note and a map in camp to be used if you do not return, showing your planned route and any alternate routes that you might take. Include the expected **time** and **date** of your return.
- If you must travel alone, be sure that there is someone who will come to your aid promptly if you do not return (See Section 3.2.3 of the Health, Safety and Reclamation Code for Mines in British Columbia and Section 4.21 of the Workers’ Compensation Act of British Columbia Occupational Health and Safety Regulation in Appendix 8).

- Be aware of the location of cliffs, particularly on snow-covered terrain.
 - Avoid walking above cliffs on snow-covered terrain
 - Avoid walking near edges that may crumble, i.e. snow, soil, or rock.
 - Avoid prolonged walking or working below a cliff face, but if it is necessary to do so, be alert for the sound of rock falls commencing above you, especially when the sun shines on frozen cliffs.
- Watch where you step and avoid such dangers as slippery mud and logs, or unstable rocks. When travelling in very dense underbrush, look before each step. You may hear rushing water before you see it, and a stream bank, dark pool, or hole may be obscured in front of you, particularly if the stream is only a few feet wide and the forest floor appears uninterrupted. When snow is on the ground, especially in spring, be aware of the possibility of breaking through the snow into an open space below.
- Stay alert to the possibility of a slip or fall; take extra care when you may land on snags, cut saplings, or sharp rocks.
- Never smoke while travelling in the bush during the summer. Take a break, so that you can enjoy your smoke, and then dispose of butt and ashes properly.
-

depend on your instruments. Carry an extra set of batteries for the GPS.

- A GPS unit does not remove the need to carry a map and compass or eliminate the need for skills to use them. Your GPS unit may not give reliable readings in heavy

Slippery Surfaces

Be very cautious about walking along logs (or avoid them entirely). If working exclusively in heavily timbered area such as Vancouver Island, consider using a pair of caulked boots. Note that caulked or equally effective footwear must be worn on logs or similar slippery services (see Section 8.23 of the OHS in Appendix 8).

- When the inner bark of a log begins to rot, it becomes very slippery when the surface is wet from dew or rain. The weathered surface of an old log (with no bark) may offer firm footing when it is completely dry, but becomes very slippery when the surface is wet from dew or rain.
- Lichen on outcrops is very slippery when wet (the colour often changes from black or grey to brown as the lichen absorbs water).
- Do not carry pointed or sharp items in your front or hip pockets; they may injure you in an uncontrolled fall.
- Avoid areas of active rock fall, steep road cuts, recent slides and unvegetated glacial moraines. In these places you are asking for accidents. If you must work in such places **a hard hat** is absolutely necessary.
- Do not follow another person in steep terrain where rocks may be dislodged. Wait for each person to clear the danger area before proceeding, or pick a parallel path a couple of metres to one side.

Crossing Snow Patches

Be careful when crossing patches of steep snow (may result in uncontrolled slide, possibly onto rocks or over a cliff), or snow-filled hollows (may break through into mountain torrent or pool).

- The surface hardness of a snow patch will vary with the time of day.
 - In the morning (while the slope is still in shadow), it may have an icy glaze that is too hard to allow you to make adequate footholds with your boot. This is particularly dangerous because there is little hope of stopping if one starts to slide.
 - In the late afternoon, the snow surface may soften considerably and make walking very slow and arduous.
- Cornices (overhanging crests of snow on ridge crests) are particularly dangerous. If you are travelling on a snow-covered

ridge, be certain that you are not walking on a corniced part of the ridge; the unstable overhang cannot be seen from above. Travel well back from the edge. Avoid slopes below a corniced ridge because of the possibility of the cornice breaking off, which might trigger an avalanche.

Crossing Creeks

- your pack before attempting to drink from a stream or pond, as the pack can tip over, pinning your head beneath the water.
- Slow-flowing, meandering streams with swampy banks present a different type of hazard.
 - The water may be fairly shallow at the swampy margin of the stream, but the bottom may drop off vertically at the edge of the main flow channel.
 - Muddy water may obscure this sudden change in depth; if you are carrying a pack full of rocks, you may drown before you

- Many climbers use a good quality lip salve to protect the lips.
- Wear a good hat when you are in the sun, even if you have a good head of hair.

Special Equipment for Steep Rock, Snow, and Ice

Although specialized tools have evolved for rock- and ice-climbing and skiing, a few basic items will suffice for most field work. Purchase the best quality you can afford, from salespeople who can advise on their use and care. **Proper training is essential before these items can be used effectively. Carrying these tools without knowing how to use them properly gives a false sense of security.**

- An **ice axe** is for travel on steep snow and ice. Used properly it can

to hold the ice axe by the head and keep it somewhat below you so that in case of slip the weight of your body will drive it into the snow.

- On steep, hard snow, falls can often be stopped only with the ice axe. If you are sliding feet-first, on your back, hold the ice axe with one hand on the head (adze on the thumb side), and with the other hand low on the shaft. Roll over towards the head of the axe,

were standing on (or beneath), collapsed without warning and they were carried down the slope in an avalanche.

Glacier Travel

- Crevasses and icefalls are the special dangers of glacier travel. Even a small or flat glacier can have hidden dangers. Many hazardous crevasses are completely covered by surface snow or appear only as narrow cracks, but widen beneath the surface snow.
- On snow-covered glaciers, **the party must be linked by a rope**. An unroped fall into a crevasse is usually fatal. An inexperienced or ill-equipped party has no choice but to **stay off snow-covered glaciers**. It is easy to move unawares from a safe snowfield to a snow-covered glacier.
- Rescuing someone who has fallen into a crevasse, even if roped, is generally a very difficult task, even for a party trained in crevasse-rescue techniques.
- On “dry” glaciers (bare ice without snow cover), it is safe to travel unroped if crampons are worn and if steep areas are avoided. Falls on ice normally cannot be stopped with an ice axe.

Bad Weather

- Weather changes dramatically and rapidly in the high mountains, even in summer. Snow and fog are common in many ranges.
- Route-finding in bad weather above timberline can be very difficult. It is easy to proceed from safe and familiar terrain to dangerous and unknown obstacles. With fog, the perception of distance is distorted and sense of direction is suspect. A major hazard is the inability to discern dangerous terrain such as cliffs below or potential avalanche slopes during foggy conditions.
- If you are lost in the mountains in bad weather, you must decide whether to stay where you are (and safe) or attempt to get below the base of the clouds. This decision may depend on how exposed you are to the weather and how easy it is to reach a sheltered spot. A good map and knowledge of your position, and perhaps information (via radio) on the level of the clouds, are the best information you can have. Travel dangers must be balanced against the possibility of exposure and hypothermia. Always carry

extra clothing and some means to rig an emergency shelter. Then an uncomfortable night will not become a life-threatening emergency.

Medical Problems

- **Dehydration** is a common and often unrecognized problem. It is easily prevented by an adequate fluid intake. Drink plenty of water, fruit juice, non-caffeinated pop, soup, and similar liquids. Avoid alcoholic and caffeinated drinks such as tea, coffee, caffeinated pop, and hot chocolate, because alcohol and caffeine increase water excretion. The tendency to become dehydrated increases with increasing altitude.
- **Hypothermia** (depression of body core temperature) is a serious danger in bad weather, where the lack of shelter and inadequate clothing accentuate the effects of the harsh mountain climate. See Chapter 3 for prevention, symptoms and treatment of hypothermia.
- **Frostbite** most commonly affects toes, fingers and face. Adequate clothing and properly fitting boots will prevent frostbite. For superficial frostbite, rewarm with body heat. Deep frostbite should not be rewarmed except by competent medical aid.
- **Altitude Sickness.** Shortness of breath, headache, and weakness are experienced by some individuals at altitudes as low as 2,100 metres (7,000 feet).
- **Pulmonary edema** is a fairly common, and frequently fatal, form of altitude sickness at elevations as low as 2,700 metres (9,000 feet). It is marked by cough, nausea, weakness, rapid pulse, dizziness, and a gurgling sound. Immediate removal to lower altitudes and medical aid are essential for survival.

Avalanches

Avalanches are a leading

Avalanches rarely start in standing timber, but slides from above can cut swaths through mature forest.

- Avoid hollow-sounding areas and slopes that suddenly settle when you are on them. These can indicate the presence of dangerous slab conditions.
- Most avalanches start on slopes ranging from about 30° to 45° in steepness, but once moving, they can sweep over flat valley floors for great distances.
- Particular care is needed during and shortly after storms or snowfalls.
- Conditions change from day to day, and yesterday's safe route may be today's death trap.

- **Crossing Suspect Slopes**

- Cross as high as possible, leaving most of the dangerous snow below. Put on mittens and spare clothing. Loosen pack and skis so that they can be discarded quickly if caught.
- Cross one person at a time. There is no point in everyone being overwhelmed. Cross quickly. The rest of the party should watch closely. Should an avalanche occur, note the spot where the victim was last seen.

- **Caught in an Avalanche**

- Discard pack, skis, and other equipment.
- Fight to stay on the surface: make swimming motions. Try to make your way to the side of the avalanche.
- If buried, inhale deeply as the avalanche slows to a stop and try to make a breathing space in front of your face. Stay calm. Don't try to fight to the surface unless you can see light.
- Death is commonly by asphyxiation. The snow consolidates almost instantly after coming to a stop. The crushing weight and eventual lack of oxygen are the leading killers.

- **Searching for Survivors**

- **Call for help – a satellite phone is a must.**
- Further avalanches are possible. Post a lookout and pick an escape route.

the mountains read this book. It contains much of value, if you are interesting in rock climbing or mountaineering, and even if you are not working in mountainous regions.

- Wilkerson, James A. (editor) (2001). *Outdoor First Aid*, 5th edition. Seattle: The Mountaineers.
- Excellent, comprehensive handbook, useful for anyone working in the field. Starts where most first aid manuals leave off.

Boats and Canoes

Transport Canada is phasing in new

Due to rapid changes in elevation, most rivers, particularly in British Columbia, are not navigable and no attempt should be made to utilize these for transportation.

Use of boats in ocean waters for exploration purposes requires special knowledge of seamanship and should only be undertaken by those with appropriate training and experience.

Always endeavour to check local conditions with a knowledgeable resident.

Preparation

Prior to beginning any boating activity, several essential factors should be considered:

- Transport Canada requires that all small craft less than 18.0 feet (5.5 metres) in length and under 10 horsepower (7.5 kW) in power must carry one (1) approved PFD per person being worn aboard, paddles or oars, a bailing device,

- (3) Notification of abandoned or empty vessels floating on the surface of the water should be made immediately to the RCMP.

In addition, the AME BC Health & Safety Committee strongly recommends that:

- (4) In any exploration operation requiring transportation by water, that the use of unpowered canoes less than 5.5 metres in length be avoided and that pr

En Route Safety

Once launched, a boater can reduce the chances of being involved in an accident. Major considerations include:

- Practising proper navigation and safety skills. Enough emphasis cannot be placed on the use of proper boating safety techniques. It is important to learn these in a formal setting from professionals.
- Keep a constant watch on the wind and developing weather as squalls may build up in a matter of a few minutes, especially on interior lakes.

Ensure Survival

If an accident occurs to the user of a small craft, his/her chances of survival are increased by having a basic knowledge of small craft safety survival and rescue procedures. Everyone should stay by the craft in the event of an upset. Climb on top of the craft or get as high up as possible and huddle together. Use an emergency whistle or sound-making device (see Hypothermia in Chapter 3).

Equipment

- Oars or paddles
- Bailer – empty can or pail—attached to boat with a line
- Towline of reasonable length (minimum 2.5 times boat length)
- Flares
- Survival kit – first aid, spare blankets, flares, waterproof matches, emergency rations
- Radiotelephone or satellite telephone communication with base camp
- Repair kit – tools for outboard motor, shear pins, operating manual, patching equipment for cracks
- Fuel and lubricants
- Sea anchor

Safety Notes

- **Loading**
 - Avoid overloading. Passengers and equipment must be arranged with respect to centre of gravity. If loading in

sheltered water, and travelling in open water, make allowance for larger waves.

- **Fuel**
 - Ensure that adequate fuel supplies are carried, with provision for emergencies.
 - Monitor fuel consumption closely so that refueling may be carried out on shore. This provides an escape route which would not be available on open water and avoids possible stranding due to restarting failure.
- **Lake Travel**
 - Stay close to shore whenever possible. When travelling across large bodies of water, endeavour to head at a 45° angle into waves.
- **Ocean Travel**
 - Never travel without local tide charts (and know how to use them).
 - Stay close to shore, but during rough conditions keep well clear of shore break while keeping land in sight.
 - When beaching small boats, make allowance for tides.
 - Do not travel in foggy conditions.
- **River Travel**
 - Do not attempt to run rapids – be prepared to portage or to “line” canoe from shore using lines attached to the bow and stern of the boat.
 - Strong currents must be taken into account when approaching shore – watch for fallen trees or sweepers.
 - Logjams are a major hazard. In unknown terrain examine aerial photos for evidence of predictable hazards and portage around any suspicious areas.

- Professionally taught Small Craft Safety Survival/Basic Boating Safety courses are available from the Red Cross Water Safety Service throughout western Canada. In addition to being held regularly, especially in the summer months, courses and workshops can be organized solely for your group by contacting:
 Canadian Red Cross Water Safety Services
 100-1305 11 Avenue SW
 Calgary, Alberta
 T3C 3P6
 Telephone: 403-205-3448
www.redcross.ca
- Ensure that anyone doing exploration work using boats knows how to swim.

Snowmobiles

- The use of snowmobiles, whether for recreation or work, is associated with a high rate of serious injuries.
- Obey all laws enacted by federal, provincial, and local government agencies pertaining to safe use and operation of snowmobiles. Note that WCB regulations pertaining to Mobile Equipment apply to snowmobiles (see applicable sections of Part 16 of the Workers' Compensation Act of British Columbia Occupational Health and Safety Regulation in Appendix 8).
- WCB regulations state that all operators and passengers shall wear approved (by Motor Vehicle Branch) safety helmets, faceguards, and suitable eye protection.
- Become aware of the effects of wind-chill factor on exposed skin and dress accordingly. Learn the signs and symptoms of hypothermia (see Chapter 3) and its treatment. Hypothermia is the greatest hazard encountered in snow vehicle travel.
- Maintain a safe speed and keep the snowmobile under control.
- Avoid areas where avalanches are possible. Travel in heavily treed areas, tops of ridges or flat areas away from avalanche paths.
- If travel over lakes or rivers is absolutely necessary, test the thickness of ice beforehand and avoid areas with fast flowing water, such as narrows.

- Watch out for overflow conditions.
- Beware of hidden obstacles such as fence wires and boulders.
- Be aware that some light conditions make it difficult to see hazards. Drive so you can stop within your limits of visibility.
- Learn general maintenance and trouble-shooting procedures for the machine.
- Become familiar with maps and compass readings, survival techniques and ground-to-air rescue signals (see Aircraft – Hand Signals in this chapter and Chapter 9).
- Do not unduly damage the environment or harass wildlife.
- Carry repair kits.
- Carry survival kits on extended trips.
- If using a Sno-Cat, ensure that there is an escape hatch in the roof.

Essential Equipment

Essential equipment, sufficient for each person and machine, to be

•

- Adjust your speed to the driving conditions. Drive steadily and smoothly maintaining sufficient distance between your vehicle and the one ahead to allow you to stop if the other vehicle comes to an abrupt stop.
- Avoid driving fatigue. If you begin to feel sleepy, stop and have a nap, or change drivers.
- Maintain an even temper. Don't let someone else's bad driving cause you to lose your temper and have an accident.
- Yield your right-of-way if necessary; don't insist on it.
- Maintain the vehicle properly, and when renting or leasing choose a reputable company.

- Ensure that all ATVs are insured. ATVs must carry a minimum of \$200,000 liability insurance when ridden on active Crown logging roads in BC - \$1,000,000 in insurance is recommended.
- Ensure that all ATVs and personnel meet the current provincial or territorial legislation – at time of press, BC is the only jurisdiction in North America that does not license ATVs.
- No horse play or racing should be permitted – too many accidents have resulted.
- Special hazards include the following:
 - Sprains or back injuries may occur when picking up a fallen ATV.
 - Burns may result from contact with exposed exhaust pipes.
 - Blind corners on narrow trails or roads may cause collisions with other vehicles or persons unless particular care is exercised – slow down!
 - Unless goggles are worn, overhanging branches may lead to serious eye injuries.
 - When crossing small streams, the depth of water and the type and condition of the banks and stream bed should be checked as they can cause spills.
 - Be aware of the possibility of fallen trees across your trail.
- The ATV is a valuable aid to the prospector or geologist, and its limitations should be respected.

Motorcycles

Aircraft

The nature of mineral expl

- Use only registered, chartered, passenger aircraft, preferably from an audited charter company, or a company that has a reputation for safe, reliable operations.
- Use only pilots who have flown more than the minimum number of required hours on the type of aircraft to be used, and who are rated for the conditions.
- No one may fly as a passenger or an ad hoc crew member on: 1) an aircraft chartered for cargo, 2) geophysical surveys, 3) on a helicopter carrying a load on the cargo hook.
- There must be no stunt, trick, or extreme flying on aircraft.

Pre-Flight Actions

- Ensure a flight plan is filed. This should be with Flight Services.

- Terrain, weather, and altitude of area of operation
- Seating capacity
- Visibility for passengers
- Maximum and average loads to be carried
- Range required
- Fuel consumption
- Airspeed
- Special equipment to be carried (internally/externally)
- Medevac capability (litter kit)

The type of terrain will influence helicopter selection. For instance, a reconnaissance-type program may require many landings on irregular ground surfaces with relatively confined landing sites. In such a case, it would be prudent to have excess power available and a machine with relatively short rotor blades and a high skid to ensure sufficient ground cover clearance.

Although similar hazards are present in the operation of all helicopters, including the lighter models (e.g. B206, AS 350, and Hughes 500), there are several safety-related implications associated with the use of medium and heavy lifting helicopters (e.g. Bell 204, Bell 205, B 212, S-61, and S64 “Skycrane”). These larger helicopters are used for the development of vertical reference slinging (long line) and the transportation of sophisticated externally carried electronic equipment

The development of vertical reference slinging (long line), and the transportation of sophisticated externally carried electronic equipment in exploration has several safety-related implications. Although similar hazards are present in the operation of all helicopters, including the lighter models (e.g. B206, AS 350, and Hughes 500), the greater size and lifting capabilities, the use is accompanied by more noise and rotor downwash and possibly more confusion in the landing or loading area. Some operators provide loadmaster specialists as crew members who are given the responsibility for organizing and positioning loads. In the absence of a loadmaster, it is essential that your personnel have clearly defined safety responsibilities and authority.

The Pilot

In the field, if you are unfamiliar

In-Flight Procedures

- Wear seat belts at all times.
 - Do not smoke.
 - Do not open doors or windows in flight unless instructed by the pilot.
 - Do not extend parts of your body or equipment out of the aircraft unless instructed by the pilot.
- Do not throw anything from a moving aircraft unless specifically approved by the pilot.
- Do not talk to or unnecessarily distract the pilot during take-off, climb, descent, landing or when flying in difficult conditions.
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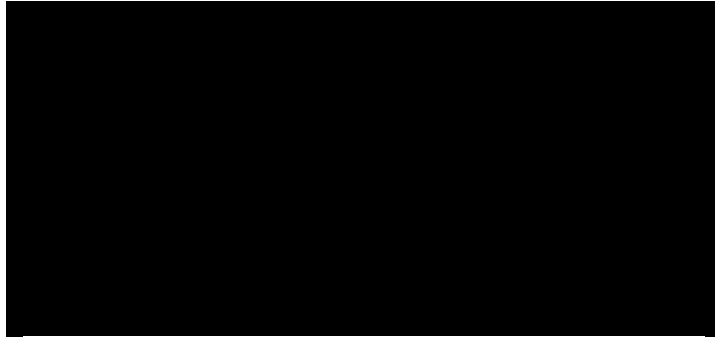


Figure 2
Approaching to Leaving a Refugee



Figure 3
Safe Entry/Exit on Sloping Ground



- Always approach/leave a helicopter from the downhill side, in a semi-crouched position, in full view of the pilot. Only approach from the front after the pilot has seen and acknowledged you. Walk, never run. (Figures 2,3)
- Under no circumstances, approach the tail rotor or move behind the rear passenger doors or baggage compartment of the helicopter, or move to the other side of the helicopter by crossing under the tail boom. (Figure 3)
- Helicopter supported reconnaissance programs commonly involve landing, hovering, vacating, entering, unloading or loading a

- Doors
 - Opening
 - Closing
 - Latching and locking
- Baggage and Cargo
 - Bear spray
 - Dangerous goods
 - Long items
 - Thrown objects
 - Secured cargo
 - Weight
 - Baggage doors
 - Cabin baggage
 - Electronic devices
- Seat Belts
 - Use of
 - Adjustments
 - Release
 - Stowage
- Communication
 - Use of headset
 - Hand signals
- Emergency Procedures
 - Pilot's direction
 - Exits – location, operation, disabled person
 - Ditching
 - Life jackets – location, operation
 - Raft – location, operation
 - ELT – location, operation
 - Briefing card – location
- Safety Equipment
 - First aid kit – location
 - Survival kit – location
 - Fire extinguisher
- No Smoking
 - In helicopter

- Within 15 metres (50 feet) of helicopter
- Within 30 metres (100 feet) of fuel storage

Special Operations Procedures Briefing

- Helipad Procedures
 - Size
 - Function
 - Clear of loose objects – clothing, tarps, plywood, etc.
- Approach and Departure
 - Clear of personnel
 - Clear of vehicles
 - Clear of power lines
- Landing Sites
 - Size
 - Terrain
 - Loading procedure
 - Unloading procedure
 - Special conditions
 - Pilot's instructions
- Special Equipment
 - Long lines – type, function
 - Carousel – type, function
 - Hook(s) manual release
 - Hookup procedure
 - Ground crew safety
 - Hand signals
 - Radio communication
- Hover Exit
 - Seat belts
 - Headsets
 - Baggage
 - Weight transfer
 - Mustering (gathering) point
 - Pilot signals & instructions

Emergency Procedures and Exits

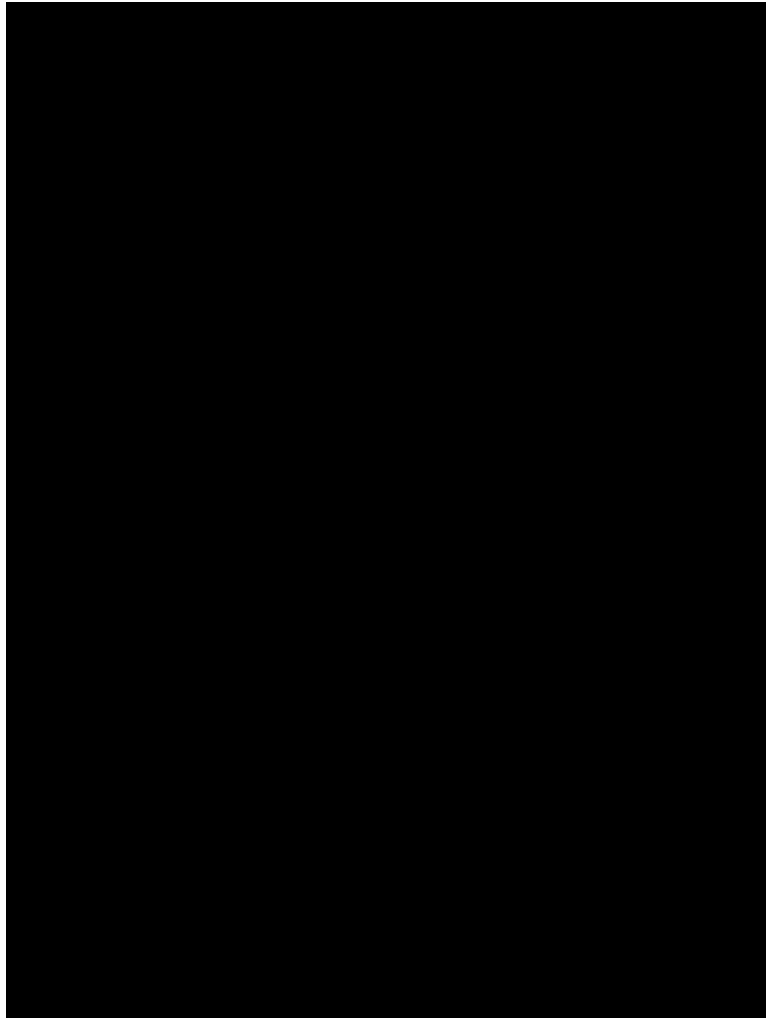
A seat belt is required for every passenger. The seat belt must be secured during takeoff and landing and whenever considered necessary

In large fixed-wing aircraft, each passenger seat is provided with printed information listing the emergency equipment carried and the location and operation of emergency exists. In smaller charter aircraft, there may be no emergency exists.

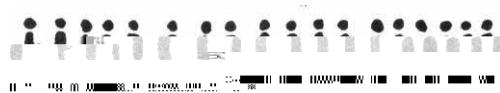
operation of the radio and knows how to describe the camp's location and the proposed routing of the aircraft. There have been many instances in the past where proposed or changed flight plans were not filed, or the flight plan was inadequate or changed, and serious delays have resulted in missing aircraft and passengers.

- A properly filed flight plan leading to rapid location of downed aircraft and passengers and crew could be the determining factor in whether injured individuals survive.
- Ensure that the pilot has an adequate copy or copies of maps covering the complete flight area.
- Ensure that the pilot accurately locates the drop-off point on a map unless he is thoroughly familiar with the area.
- If the pick-up point is at a different location from the drop-off point, be sure that it is accessible to the aircraft and agree with the pilot on an alternate pick-up plan if necessary. As a general rule, if the pick-up point is different from the drop-off point, the proposed route should be flown before drop-off. This will only take a few minutes of extra flying time and it may save the ground party several hours, particularly if the pilot

Helicopter Approach and Take-Off Procedures



Ensure that there are no loose items near the landing site which could be blown into the rotor blades either during the approach or take-off of a helicopter (see Landing Site).



When moving larger crews:

- Brief them on safely as above.
- Keep them together and well back at the side of the landing zone. This gives the pilot more space to maneuver in the event he has to land suddenly either during landing or take-off.
- Have them face away and shield their eyes from machine during landing and take-off.
- Have each passenger look after their own personal gear.
- Have passengers paired off and ready to get aboard as soon as pilot gives the signal.

Inside the Helicopter

Keep your seat belt fastened until the pilot signals that he is satisfied with the landing site. Ensure that no items which could obscure the pilot's field of vision are against the bubble. Similar care should be taken to ensure that items such as seat belt buckles and earphones are not allowed to get jammed underneath the helicopter controls. There should be no unsecured baggage.

Never throw any object while near a helicopter, either in the air or while on the ground, to avoid objects being sucked into moving parts.

Landing Sites

Prior to arrival of the larger helicopters it is necessary to prepare loading and landing sites free of loose debris and with dimensions adequate to accommodate freight being handled. Normally the volume of freight and weight of individual pieces is such that very little can be organized once freighting begins. If possible, a tractor should be on

hand to move heavy pieces from nets and slings so that hernias and other muscle damage can be avoided.

Experience will give you an idea of how much room is required and type of site each pilot requires. Some pilots and helicopters require more room and more level sites than others. For your own safety, it is essential that you find or prepare a site which your pilot will use with confidence. Remember that every helicopter landing is a unique combination of winds, terrain, elevation and temperature. If you are on the ground, stand on the upwind side of the landing site, if possible, and signal the wind direction, preferably with flagging or, alternatively, with your arms (back to the wind with arms pointing in wind direction). Remember that all aircraft take off and land into the wind.



Clear any obstructions from the landing site area, bearing in mind the clearance required for the tail rotor. In tight landings, the pilot may want you to help him position his tail, which he cannot see (whether you are inside or outside). Use your thumb to indicate direction tail is to move and your palm to indicate

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If the pilot has not provided instructions on an adequate landing pad, or if instructions are forgotten, for small helicopters allow a level landing area about 4 metres by 4 metres and clear the area to ground level within 6 metres of the landing pad to provide main rotor clearance and tail rotor clearance in two directions. If a landing pad is required in soft ground place 5 or 6 poles on the ground, each about 4 metres long and about half a metre apart perpendicular to the prevailing wind direction, i.e., the flight path. Poles must be secured to ensure they cannot move. Poles rot quickly

is required to ensure that the tips of the main rotor blades are a safe distance above the ground. Since both the pilot's hands are occupied with the controls, passengers must ensure that doors are securely latched before the helicopter departs and that no items are permitted to interfere with the control of the aircraft. In addition, passengers should control their own movements to avoid sudden shifts of weight.

Confirm with the pilot beforehand in which order he wishes passengers to embark or disembark, as it may affect the aircraft balance. Remember to ensure that the cabin door is firmly closed and that seat belts are inside the cabin when disembarking.



N.B. Toe-in landings are illegal unless the operator has an amendment to his Operating Certificate and Operations Manual which provides for such landings.

Cargo

Personal baggage and equipment should be properly secured. In fixed-wing aircraft, cargo carried inside the cabin with passengers should be secured by nets, strapping or other tie-down to prevent shifting in flight and possible injury or fatality to passengers in the event of a crash or hard landing. Cargo should not restrict the use of emergency or regular exits. It is the pilot's responsibility to ensure that the aircraft's total allowable payload is not exceeded and to ensure that the load is distributed so that the aircraft is within its centre of gravity limits; however, the pilot often has to rely upon the advice and knowledge of the passengers. Extra items should never be loaded on the aircraft without the pilot's knowledge and the weight of items should be determined as accurately as possible.

If legally permitted, externally loaded equipment must be tied on helicopter racks under the pilot's supervision to avoid loss of items or possible damage to the helicopter during flight by loose buoyant equipment being sucked into the main and tail-rotor blades. Use only



Passengers are not permitted to travel in the helicopter during a slinging operation.

The following is a suggested check list for pilots to familiarize your staff with external load hook up procedure.

11. Explain hazards to personnel and aircraft posed by unsecured material in the working area.
12. Explain in detail safety procedures required while working in the proximity of helicopters, including risks associated with fouled long lines.
13. Establish an emergency response plan.
14. Allow trainee to experience a minimum of three demonstration hookups with the aircraft operating.

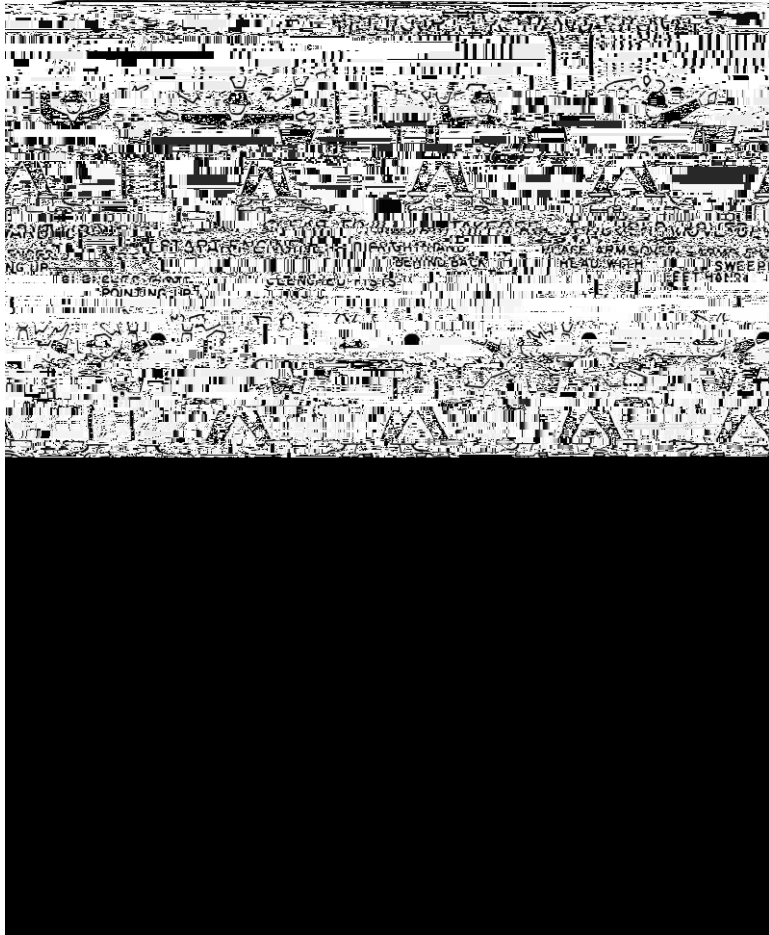
Signals

Review section 29.5 of the Workers' Compensation Act of British Columbia Occupational Health and Safety Regulation in Appendix 8 for specific regulations.

Hand Signals - Helicopter hand signals are shown overleaf. In the past, most helicopter or fixed-wing operators have not acquainted passengers with air-to-ground or ground-to-air signals that should be used for communication purposes. However, the hand signals are given here as inevitably, there will be times when it is advantageous to know them (e.g. when mobile radios are not available for slinging operations).

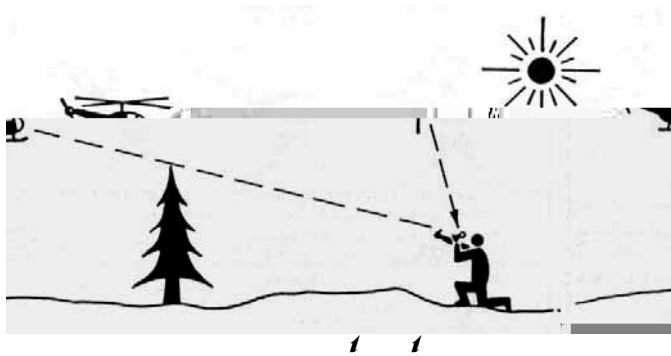
Air-to-Ground Signalling - Without adequate air-to-ground radio communication, the pilot has extremely limited ability to communicate with the crew on the ground, the most common signal being the 'wing-waggle' of the fixed-wing pilot to notify those on the ground that they have been sighted or that a message has been received.

The helicopter pilot must brief passengers on pick-up or emergency pick-up arrangements before they leave the aircraft, e.g. proceed for pick-up in the direction of the helicopter after three tight circles.



Ground-to-Air Signalling - There are many established procedures for signaling aircraft among which the following are most common:

- **Bright Coloured Clothing** – fluorescent jackets or caps can be spotted far more easily than drab coloured bush gear.
- **Fluorescent Orange and Red Cloths** – these are generally made of nylon and should be at least 2 by 2 metres in size. When on a traverse, drop the folded cloth over your packsack if expecting a helicopter pick-up.
- **Pocket Flare Gun** – this is pen-shaped with a pocket clip and a spring-loaded mechanism which, when released, can discharge flares to a maximum height of 60-70 metres. It is particularly useful when a helicopter is trying to locate personnel in forests.
- **Heliograph Mirror** – most useful for attracting fixed-wing or rotary wing aircraft on sunny days. The mirror contains a small sighting hole to pin-point targets. Avoid use of the mirror when close to a helicopter.
- **Mirror, Brunton Compass Mirror, Metal Clip Board, etc.** – similar principal to the heliograph mirror but less precise. The best signaling procedure is to extend one arm with the thumb held vertically on target and, with the other hand, line up the reflection of the mirror held at eye-level on the thumb. The top of a small tree at greater distance can be used for greater sighting accuracy.



- **Smoke Fire** – On bright days, smoke is more noticeable than fire, while on dull days or in twilight, the reverse applies. Smoke dissipates quickly in a strong wind and a small fire is useless in these conditions. Keep green boughs



- **Signal Code** – Previously recommended ground-to-air signal codes, using visual elements laid out on the ground, are so rarely used that the cryptic messages are unlikely to be recognized by current pilots and are no longer recommended for communication purposes. These may be useful to attract attention if you are lost or stranded. During Search and Rescue, use a variety of ways to attract attention to yourself.

Emergency Equipment for Fixed-wing Aircraft and Helicopters

All aircraft, both fixed-wing and helicopters, should be equipped with the following emergency equipment:

- ELT, preferably equipped with both an impact and a manual switch
- Emergency rations of a suitable quantity to meet Transport Canada regulations for the number of persons being carried (only required when flying over sparsely settled areas as defined in Air Navigation Order (ANO) Series 5, No. 12).
- First aid kit

- Gun (12-gauge shotgun is ideal) and ammunition (No. 4 shot, SSG and rifle slugs). Documentation is required.
- Hunting knife
- Fire makers (matches in waterproof container)
- Pyrotechnical distress signals
- Snare wire
- Fishing tackle and fishing net
- Cooking utensils
- Survival booklet (see Chapter 9)

Additional items in winter:

- Snowshoes
- Extra socks and mitts

- Always be aware of low flying airplanes over the airstrip (The pilot will usually make one pass over the airstrip before landing. If you are on the runway at this time, make sure that the runway is clear and leave the runway immediately).
- Always remain clear of the runway during take off and landing.
- Only approach the airplane once the pilot has given the ok signal.
- When loading and unloading be careful about driving around the airplane and under the wings.
- Remove any obstacles for the runway or notify the camp manager if there are any problems so the pilot can be informed.

Chapter 8

International and Long-Distance Travel

Know the country you will be working in, its customs, and safety risks. Consider obtaining a country risk analysis. Be fully prepared before

- **Luggage** – Carry functional, but not expensive or fancy bags, as they tend to be broken into more often. Travel as light as possible,

- Vary your routine if in one location for some time.
- Be aware of the location of safe havens such as embassies, police stations, government locations, petrol stations, or hotels.
- Be careful of unmarked taxis.
- Don't go into unsafe areas (cities, towns, or rural) particularly alone or at night.

If you are abducted:

(NOTE: With increased of hostility toward foreigners in many countries, there is a higher chance of abduction.)

- Do not struggle or resist unnecessarily.
- Avoid heroics and injury and do not provoke your captors.
- Do not attempt to negotiate your own release or promise that ransom conditions will be met.
- Do attempt to signal authorities that you have been abducted. Use pre-arranged signals, if possible.
- Do not attempt to escape. (Only 6% of kidnap victims are harmed and most of these while trying to escape.) But, be prepared to escape when your rescuers arrive.
- Take care of yourself, rest when you can and drink what you can, but avoid alcohol. Attempt to exercise and remain in physical and mental shape. You never know when action or what action will occur.
- After the initial tenseness of the situation has subsided, engage your abductors in rational, unemotional conversation. A rapport will develop, which may render less harm and quicker resolution.

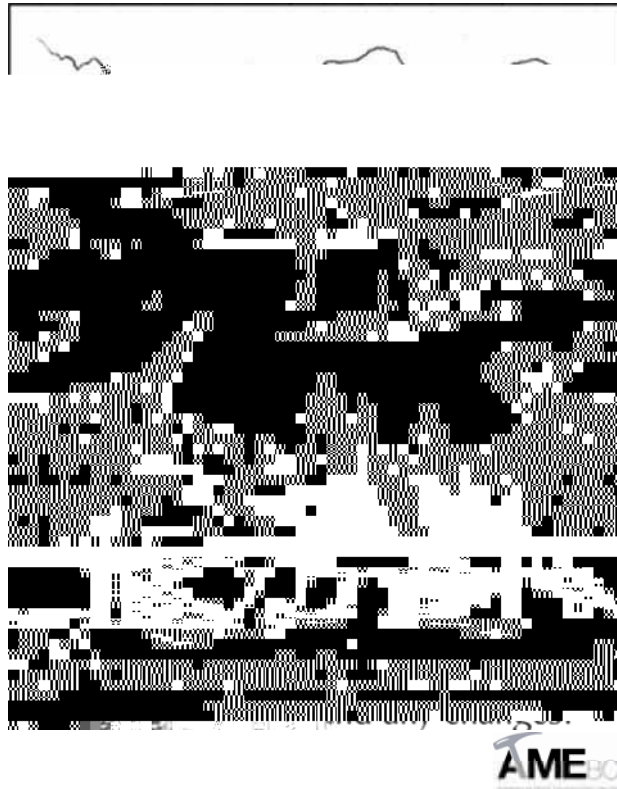
Hijacking or Hostage Situation

- If reasonably able to do so, retain your identity documents.
- Do not pursue the hijacker(s), but attempt to remember as many details as possible. Write them down if possible.
- Report the hijacking to the nearest police as soon as possible.

Robbery, Extortion/Bribery, Violent Assault

If robbed, assaulted, or confronted with extortion/bribery:

- Avoid heroics.
-



Chapter 9

Survival

ground must carry appropriate equipment and have the knowledge to enable them to survive an unexpected night out of camp.

- Sleeping bag – If you go on an aircraft or beyond walking distance from camp you should have it with you.
- At base camp, a dated log should be kept in conjunction with a map detailing locations being worked by each individual. It should indicate pick-up and drop-off points if an aircraft is being used. If all personnel are leaving camp, this information should be included in a daily radio log transmitted so that someone will know:
 - if they are missing.
 - where to look if they are missing.

Suggested Equipment to Carry in Pockets or Backpack

- Satellite telephone and Geographic Positioning System (GPS)
- Fire starting kit – matches in waterproof container, cigarette lighter, dry wood shavings or flammable material
- Pocketknife – large two-bladed jackknife or Swiss army knife. A strong, well-made solid-shank hunting knife is preferable.
- Compass and topographic map or air photograph of general area to

- A small backpack survival manual if possible (e.g. the Collins Gem version of [Survival Handbook](#)); see Reference Material) in waterproof bag.

Don't Panic – The Psychology of Survival

Fear and ensuing panic in an emergency survival situation are your biggest enemies. The person who can recognize the symptoms and is well prepared to deal with pain, cold, hunger, thirst, fatigue, boredom, and loneliness, will be best able to cope with the normal fear and confusion which confronts anyone in an emergency situation.

Remember that someone else on your crew knows your approximate position and that a search will commence as soon as you are overdue. During summer, a person properly equipped with a survival kit will not suffer from exposure and your greatest danger is injury to yourself or making your plight worse through panic.

Assisting the Search

The search will be from a helicopter or other aircraft and a person can be very difficult to see if he is in timber or if he is not moving. Therefore, apart from communicating by satellite telephone assisted by GPS, make yourself conspicuous by waving both arms in a clearing or on a ridge, by using fire, flare, signal mirror and/or signal flag, and by wearing bright-coloured clothing. If the helicopter lands and you have a rifle, wait for the blades to stop before you fire your shots. On bright days, smoke is more noticeable than fire, while on dull days or in twilight, the opposite applies. Smoke dissipates quickly in a strong wind and a small fire in these conditions is almost useless. In positioning your flag, or in timing your flares, remember that the pilot will be looking ahead or possibly to his side of the helicopter. If your intended pick-up site was above timberline, stay there as late in the day as you can, and then overnight below treeline or wherever you can keep dry and warm. The emergency equipment you carry is for situations such as this and you will certainly regret not having it when it is needed. Moreover, by not being able to signal your position, you will be wasting a great deal of money and time in the search. The following are a few general rules covering special situations:

- If you take the wrong route or suffer a crippling injury during your traverse and do not appear at your pick-up spot, do not attempt to retrace your steps unless you have ample time to spare. When the pilot realizes you are overdue, his first search will be along your planned route to see if you are injured and have lit a fire or made other signals. If you are not found, a crew will start following your planned traverse on the ground while the helicopter searchers try to analyze where you may have gone astray and anticipate where you may be. If you are in the wrong place and can walk, go to the most conspicuous point nearby, a ridge, lakeshore, river bar, or meadow, light a fire, prepare a smoke or flare signal, and wait.
- If you are in the correct place and the helicopter does not come – **stay where you are**. The helicopter may have suffered a breakdown and it may take a few hours or even several days to send a replacement. Your traverse is recorded at camp and everything possible is being done to bring you in. Depending on the time of the breakdown, a number of people may be scattered through the area or be stranded with the helicopter. If you went out in the morning with another person and his traverse is close to yours, you can try to meet up with him, but if you are unsuccessful in this, return at once to your own point. Never try to walk back to camp unless you are within 10 kilometres easy walking, know your position and route completely, have a map, and are in good condition. If you do leave your pick-up point for any reason, leave a prominent signal and a note at your pick-up point indicating your plans.
- If you are involved in an aircraft accident or breakdown – follow the pilot's orders. In his absence, the senior or most experienced person is in charge. An aircraft cannot always be spotted easily in the water, in thick timber, or if covered with fresh snow, and consequently appropriate signals should be prepared. If your aircraft is close to its flight plan route, you should be found quickly. If you are unlucky enough to be well off your planned route, stay with the plane and be prepared for a longer wait. If the aircraft will not be easily seen, you may have to make a decision to move to a more obvious or safer location, but this should only be done in special circumstances. Once again, leave a note with your

plans at the machine. If you are not found quickly, keep busy preparing signal fires and ration your provisions, bearing in mind that a full-scale search is being organized by the Air Rescue. The search will be conducted on clear evenings as well as in daylight and your signal fires are most important then. All helicopters and fixed wing aircraft are equipped with an ELT crash-position indicator and you should ensure that it is activated properly. As indicated in Chapter 7, you should obtain information from the pilot of each aircraft on your operation concerning the location of the ELT and its operating requirements.

Reference Material

These guidelines will give you the elements of preparation and survival, but a good survival reference manual should be left in camp. The two best survival manuals are:

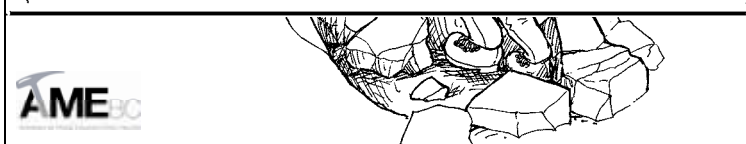
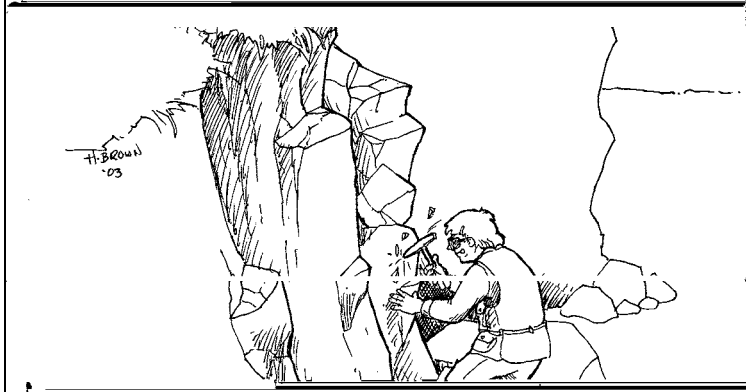
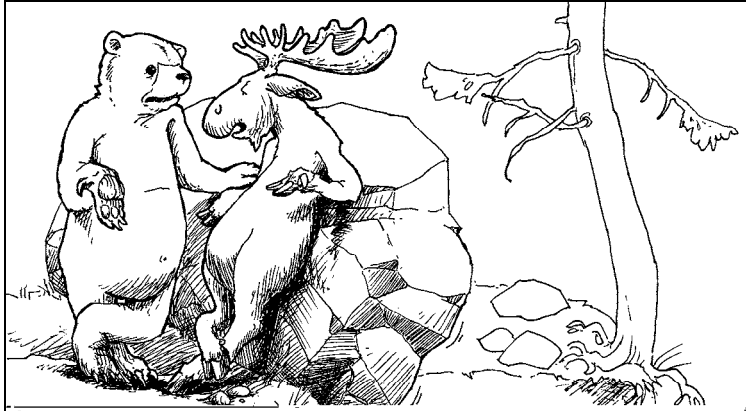
- *Survival in the Wilderness* – written by the RCAF Survival Training School staff and published by the Department of Defence of the Government of Canada. Unfortunately, it is out of print but can be obtained from libraries and secondhand bookstores.
- *Wilderness Survival* was compiled and published by: Parks and Outdoor Recreation Department, Ministry of Environment and Parks, Province of British Columbia, and is available from Crown Publications at www.crownpub.bc.ca.

Other useful sources of survival information are:

- *Wilderness Survival* (7th edition, 2003).
- *Wilderness Survival* by John Wiseman (new edition, 2006).
- *Wilderness Survival* by Bruce Tremper.
- *Wilderness Survival* by Alan Fry.

A comprehensive catalogue is available at www.yukonbooks.com/shop/customer/home.php?cat=170.

Current courses and other survival information can be obtained on the internet by searching for Outdoor Safety and Survival BC on www.google.ca.



Chapter 10

Wild Animals

In terms of danger from wild animals or insects, western Canada is a very safe place to work. Despite the large number of encounters, actual attacks from animals are rare. The main threats posed to humans are:
by:

- Bears, both black and grizzly
- Cougars
- Moose, mostly in rutting season (September)
- Animals with young
- Rattlesnakes
- Ticks
- Mosquitoes and blackflies

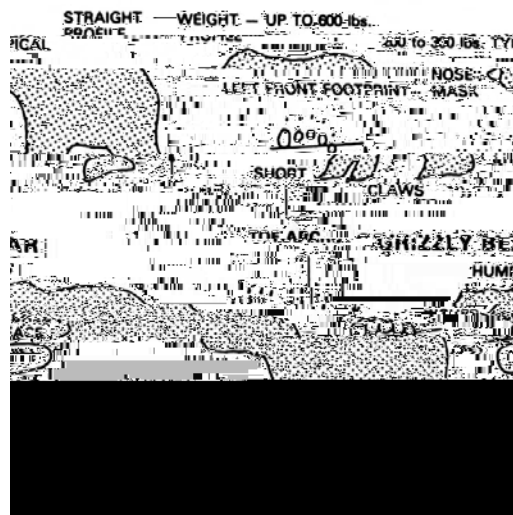
In most instances, attacks are provoked because the animal:

- Feels its safety or that of its young is threatened
- Is protecting food or territory
- Is surprised
- Has rabies (relatively rare in the wilderness) or other diseases

Identification

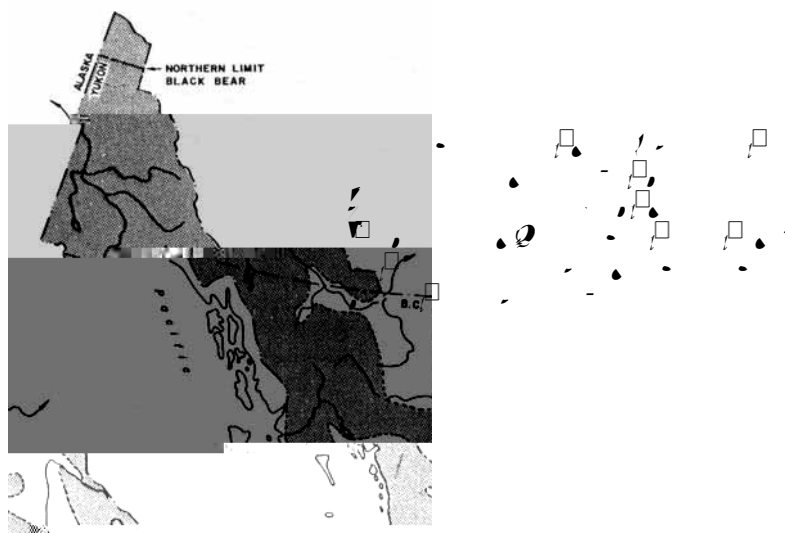
BLACK BEAR

COLOR — Black, BROWN



Habitat

- Alpine — treeless, high-elevation settings are extremely important to grizzly bears, but little frequented by black bears.
- Subalpine — fringe areas between forest and treeless alpine country offers little food for bears, and hence is not a preferred habitat except for trails.
- Forest — year-round home for black bears, but also frequented by grizzlies. Recent burns, clearings, highway edges, survey lines, etc. offer succulent new growth for food.
- Rivers and floodplains — generally have high bear activity in spring when bears descend from snowbound dens in search of food. During spawning season, fish are an important food source.



Control Measures

- Avoid areas heavily used by bears or where there have been bear problems.
- Food storage should conceal odours, and if possible, be in bear-proof containers, preferably distant from quarters and general activity area.
- Minimize food waste.
- Completely incinerate all garbage and food wastes daily.
- Bears are attracted to the odours arising from scented cosmetics, hair spray, deodorant, etc., and perhaps toward odours of women in menstrual period. In the latter instance, scrupulous personal hygiene, use of tampons and extra caution are advised.
- Almost all dogs except well-trained bear dogs are detrimental in the bush, as they may encounter bears and lead them back to their owners.

- Under no circumstances should bears be fed, as has been the practice by certain visitors in park areas.
- Keep wildlife officials informed; they may wish to deter or relocate curious bears that enter the camp area **before**

What to Do if a Bear is Encountered

Approaches toward you are unnerving but rarely result in contact.
Bears frequently bluff their way out

Using bear spray

If a bear approaches slowly or follows at a distance, fire two or three short bursts of spray between you and the bear while you back away. The spray will create a cloud of deterrent, which may stop the bear. But make sure you have enough left to spray the bear in the face at short distance if it keeps coming.

If a bear is charging, stand your ground, fire a couple of short bursts to create a cloud in front of you, and then save remaining spray for use at close range if necessary.

Using a Firearm

If you are carrying a firearm, do not use it until you are sure you have no other alternative. A wounded, adrenaline-charged bear is so dangerous that shooting should be the absolute last resort. Shotguns with heavy gauge shells are recommended.

Wait until the **attacking** bear is within 20 metres or closer if a shot gun is used, and preferably within 15 metres before squeezing the trigger, because the bear may be bluffing. If it is not, the close range

Note particularly that the front and top of the head are not suitable targets when a bear is coming at you, as the brain is only the size of an orange.

If you have to shoot a bear, contact the Fish and Wildlife Branch or Conservation Officer Service in the area, identifying the sex, species (grizzly or black bear), and location of the kill, together with the circumstances concerning the shooting of the bear. Follow their instructions when disposing the carcass.

If you wound a bear, you have the responsibility to try and kill it. Under no circumstances should you attempt this alone. Be extremely careful, particularly if you must follow the bear into brush where it can squat and be very hard to see until you are only a few metres away. Wounded or frightened bears almost invariably head for dense brush where they feel most at home, where their superior senses of hearing and smell are more useful than your superior eyesight, and where you will usually have difficulty walking and handling a firearm. No one without a suitable firearm should help track down a wounded bear.

If Mauled

In the unlikely event you have been mauled, stay still, listen and try to assess the injuries you have received. While most bears move off, they may not travel far or quickly. After about five minutes, cautiously look around. Rationally decide your best course of action based on the nearest radio, the nearest help, bright clothing, first aid, matches, and amount of blood lost. The first priority is to stop the bleeding. Apply pressure to the wound and look for something to wrap it with. Wrap firmly, but loosen it if you get a 'pins and needles' feeling.

You should sit and think. Don't move until the blood has clotted. Drink the liquid in your daypack to help your body restore blood lost.

- **You have a flare and a fluorescent-range fly sheet to alert aircraft.**
- **You have a buddy with you or working close by.**
- **You or your crew leader set up frequent radio-check times and they should start looking for you soon.**
- **Someone knows your exact travel route and timetable.**
- **You have matches, emergency food and a space blanket in your survival kit.**
- **The rest of your crew are well trained and care for your welfare.**

An investigation should follow any bear attack. No other crew members should visit the site before conservation officers.

For More Information

Two videos, “Staying Safe in Bear Country” and “Working Safe in Bear Country” are available from Magic Lantern Communications Ltd., phone 1-800-263-1818 or email west@magiclantern.ca. Another excellent video, “Bear Aware”, was produced for the Ministry of Forests. The Government of Yukon bear safety website at <http://www.environmentyukon.gov.yk.ca/fishwild/bearsafety.html> is also an excellent source of information.

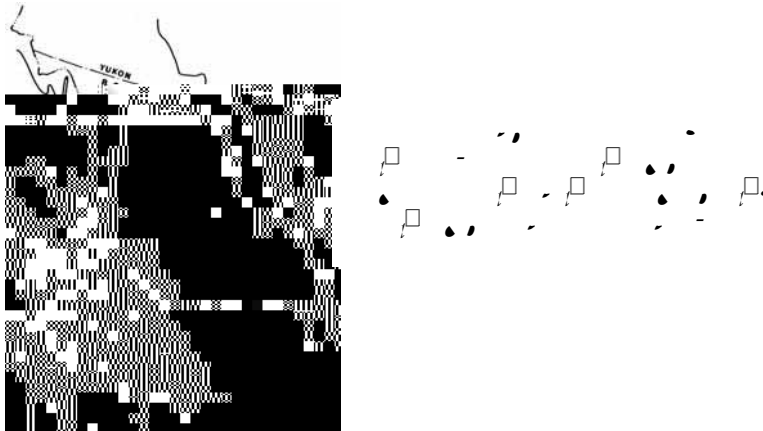
Moose

Moose frequent large areas of both British Columbia and Yukon, are commonly sighted, and seldoma and Yukon, areJenfoiv1(cell5.9(n)-3.1.1497 TD.0023 ya09 T003 um)10.8 2t

Extra caution is required when driving – in the period from 1969 to 1997, motor vehicle accidents in BC involving moose accounted for 19 fatalities.

Cougars

The cougar is the largest cat native to British Columbia and weigh on average between 45 – 55 kilograms. They are elusive and possess remarkable hunting skills. Cougars normally avoid humans. While there are few documented instances of cougar attacking humans, the frequency of attacks is increasing. These attacks are usually attributed to old or young starving cougars, or to cougars which are defending their young. If you work where you know cougars are common, it is wise to carry a heavy walking stick to use if defensive action is required. Provincial statistics from 1970-2004 indicate 6 fatalities and 40 injuries from cougars.



If you encounter a cougar two situations may arise:

- You are being watched – face the cougar, stand as tall as you can and try to appear as large as possible – open your jacket. Back away slowly, still facing it. Do not crouch down or turn your back on it and **DO NOT RUN**. Climbing a tree will not help as they are excellent climbers and can easily drag you from the tree. Some say

that staring down a mountain lion is folklore that actually works. So long as you make eye contact, the cat is unlikely to charge. You may be able to diffuse the situation even further by yawning and showing the cat that you are bored with it!

- The cougar is running at you – if unarmed there is probably little you can do, but put your pack out in front of you to protect yourself, or perhaps protect yourself with an axe, club, or hammer. Try to inflict pain on the animal with a large stick or rock as their pain threshold is very low. Aim for the face and eyes. You must never run away as this behavior triggers their instinct to chase. Throw rocks or branches at it. If you ward off an attack, treat any injury, assess the situation and rationally plan your next move. Keep cool.

If you come across a kill, leave it alone. Do not bend over to examine the carcass. Leave the area calmly, but as quickly as possible. Dogs and children are more susceptible to attack and should be watched at all times. Report all attacks to a Conservation officer of the BC Fish and Wildlife Branch.

Rattlesnakes

Rattlesnakes, preferring dry desert-like areas, range into the southern interior of British Columbia. They favour a habitat in dry rocky areas, ~~Try to in~~preferring3.9(re)JT9 n in grasslands, at the base of rockslides,

Avoid rattlesnake bites by taking precautions:

- Be familiar with the various species of snakes that live in the field area where you work so you can recognize them.
- Learn where to expect to find snakes in your work area.
- Wear “high-cut” rather than “low-cut” leather work boots. Strikes are commonly to the lower part of the legs. Wear long pants that are not tucked in. Often, fangs are caught by loose clothing and never pierce the skin of the victim.
- Be alert to the potential presence of snakes behind rocks or other shady places.
- Keep your camp free of debris and clutter so snakes have no place to shelter from the sun.
- Keep your food carefully stored to avoid mice infestations. Snakes feed on mice and will follow them into camps.
- Keep a container (garbage can with lid) and a long blunt hooked stick available to use to confine a snake and then relocate it.
- If working where rattlesnakes are common and only in an environment where it would take more than two hours’ travel to a medical facility, you may want to carry a commercial snakebite “Extractor” kit. These kits are not very effective and only extract a maximum of 30% of the venom. They do, however, have an important calming effect on the patient. Keep a list with the telephone numbers of hospitals in the area that have anti-venom in stock and can treat snakebite. You must take a snakebite victim to a place where treatment is available and it may not be widely stocked.

Treatment of Snakebite

- Wash the wound immediately with soap and water (to decrease tissue damage) and cover with a sterile dressing.
- Remove any constricting jewelry.
-

Bugs

Ticks

Of the 20-odd species of ticks in

Tick paralysis is a condition that establishes itself only when the (infected/female) wood tick is allowed to remain attached or goes unnoticed. Complete recovery follows removal of the tick if paralysis has not spread too far.

The Pacific Coast tick is common on vegetation along the Pacific Coast

- Avoid using cosmetics or soaps with fragrances.

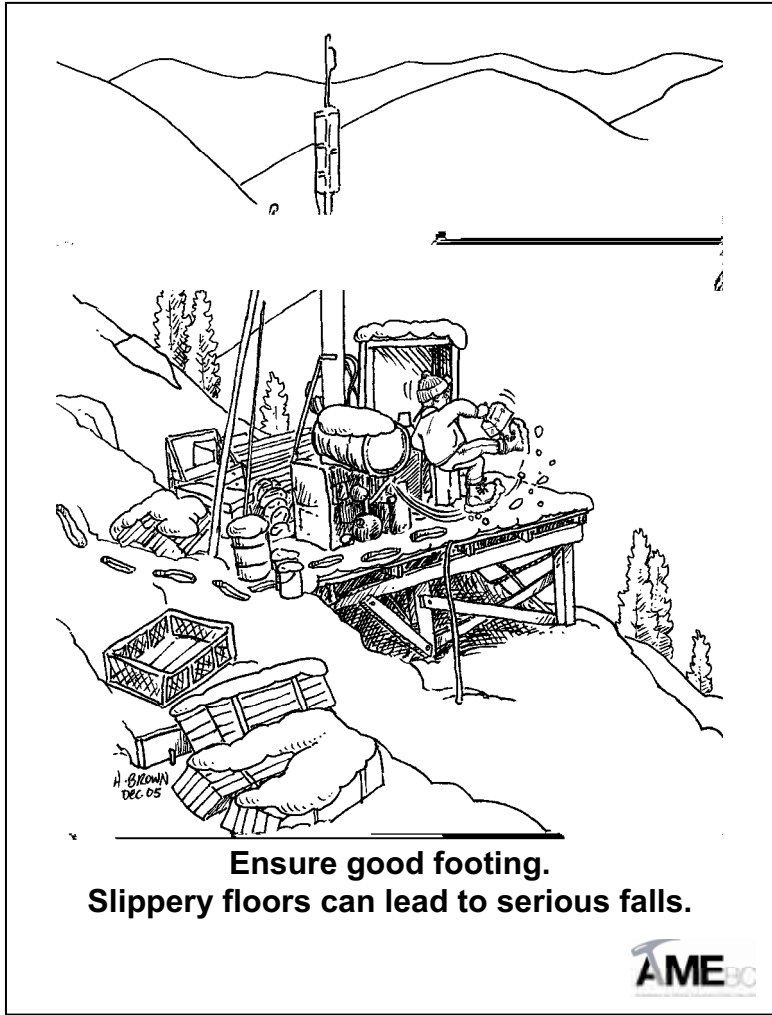
West Nile Virus

As of late 2005, there has been no reported incidence of West Nile fever in BC and Yukon. Since 1999 when the disease was first found in North America, it has spread across the USA and through most of southern Canada. It is expected that West Nile virus will soon be detected in BC.

- West Nile virus is transmitted to humans through the bite of an infected mosquito and, very rarely, through blood transfusion and/or organ transplant. One cannot recognize mosquitoes that carry West Nile virus so it is prudent to prevent mosquito bites by using appropriate insect repellent containing DEET.
- About one in five people bitten by an infected mosquito will develop symptoms of the disease. One percent of infected individuals will develop severe symptoms that may include encephalitis, meningitis, and/or paralysis.
- People with weakened immune systems are more vulnerable to West Nile virus.

Symptoms of West Nile Fever

- Fever
- Muscle weakness
- Stiff neck
- Confusion
- Severe headache
- Sudden sensitivity to light



Chapter 11

Underground Workings, Drilling Rigs, and Trenching

Underground Workings

Great caution must be exercised before and during entry when investigating inactive or abandoned underground workings. Under Section 1.12.2 of the Health, Safety and Reclamation Code for Mines in British Columbia (the Code, see Appendix 8), all underground workers must be under the supervision of the holder of a valid underground shift boss certificate.

Prior to Entry

Before beginning exploration of any type of underground workings, a **Notice to Start Work** (Section 10(1) of the British Columbia Code and section 6.2.1 of the Code) shall be sent to the District Inspector of Mines and no work shall commence until approval has been given (see Appendix 8).

In addition, the District Inspector may be able to provide information on the present conditions of the workings and if they have been inspected recently. Further, he may be able to show copies of old mine plans.

Hazards in Underground Workings

Dangerous atmospheres may be encountered in old underground mine workings, e.g. oxygen deficient, flammable or explosive and toxic gases. In some old workings, exposure to dried bat droppings may cause a lung infection called histoplasmosis. **Poor ground conditions** and **high water** are additional hazards.

Remember that old adits, particularly in the warmer parts of the Cordillera, can be a haven for certain wild animals and snakes.

Equipment

**Crews must carry minimum safety equipment as follows and be oriented to its uses and emergency response procedures.
NO ONE WORKS ALONE, and no one shares required personal safety equipment.**

Per Crew

- Oxygen detector
- Toxic gas detector
- Flammable gas detector
- Safety line (20 metres)
- Two scaling bars
- Bear deterrent

water, and advance when safe to do so – check back to portal at frequent intervals.

- No sampling or breaking of rocks is to be done on initial exploratory inspection through the workings.
- If old timbers have collapsed or rock has fallen from backs or raises, retreat immediately.
- Even solid-looking timbers may be completely rotten and have no strength – check with scaling bar.
- If there is **any** indication of a dangerous atmosphere (e.g. oxygen deficient, toxic, flammable or explosive) retreat immediately and abandon all plans for further immediate investigation.
- Underground ventilation can change from day to day and oxygen content can drop to zero in a horizontal distance of 10 metres.
- When underground, do **not** separate.
- Sampling of mineralized structures and wallrocks may be undertaken only after determining that the workings are safe – use common sense.

Continued Investigation

Any extraction of rock requires a certified shift boss to be on site. If significant underground sampling is deemed to be necessary, the services of a certified shift boss should be considered. Such retired qualified miners may live in communities near old mining areas – check with the local Inspector of Mines.

Diamond and Percussion Drills

The Canadian Diamond Drilling Association governs the rules of good diamond drilling practices at a drill site. Drill sites are also regulated by Section 9.3.1 of the Code (see Appendix 8). All drilling companies must have safety and WHMIS (Workplace Hazardous Materials Information System) binders at the work site. Ask the drilling company to supply a copy of the safety binder to the site project manager. Always ensure that the driller and the drillers' helper are aware of your presence at the drill site. Regular safety meetings involving drill crews, pilots, and geological staff must be scheduled.

The principal hazards to exploration personnel when working at a drill are as follows:

- Loose clothing caught in the drill can cause serious or fatal injuries.
-

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Appendix 1

Fatalities in Mineral Exploration in Western Canada (1982-2004)

Cause / Relationship	Number of Accidents	Fatalities
Helicopter crashes*	4	9
Canoe-related drownings	2	5
Fall from pick-up truck	1	1
Fall from cliff	1	1
Fall into crevasse on glacier	1	1
Crushed by overturned ATV	1	1
Allergic reaction – wasp sting	1	1
Drill helpers attacked by bears	2	2
Miner crushed by rock while scaling **	1	1
Total	14	22

Lost Workday Accidents in Mineral Exploration in Western Canada (1982-2004)

Cause/Relationship	Number of Accidents	Percent of Total Accidents	Lost Workdays	Percent of Total Lost Workdays
Canoes	2	0.6	30,000 ⁽¹⁾	38.6
Slips, Falls	170	46.3	14,872 ⁽¹⁾	19.1
Vehicles	41	11.1	13,261 ⁽¹⁾	17.0
Aircraft	6	1.7	12,150 ⁽¹⁾	15.6
Allergic Reactions	2	0.6	6,031 ⁽¹⁾	7.8
Improper Lifting	43	11.9	352	0.5
Cuts	33	9.2	301	0.4
Falling Objects	11	3.1	245	0.3
Eyes	19	5.3	124	0.2
Animal Attacks	1	0.3	94	0.1
Infections	8	2.2	73	0.1
Burns	7	1.9	59	0.1
Tree-Falls	2	0.6	46	0.1
Tendonitis	12	3.3	78	0.1
Frozen Feet	2	0.6	18	0.0
Drill Compressor Explosions	2	0.6	15	0.0
Fingers	4	0.3	45	0.0
Other	2	0.6	48	0.1
Total	367	100.0	77812	100.0

Compiled by the Health & Safety Committee, AME BC

⁽¹⁾ Reflects time charge of 6,000 person days per fatality (American National Standard)

Appendix 2

Fatalities in Mineral Exploration in Western Canada

Appendix 3

Accidents in North America Mountaineering

	USA 1951-2004	CANADA 1959-2004
SUMMARY STATISTICS		
Number of accidents reported	6,000	939
Total number of individuals involved	10,992	1,962
Number injured	5,073	701
Number killed	1,339	285
	Number of Persons Involved	
TERRAIN		
Rock	4,237	503
Snow/ice	2,584	504
Other, unknown	22	9
ASCENT OR DESCENT		
Ascent	2,853	578
Descent	2,199	362
Other, unknown	255	12
MOUNTAINEERING EXPERIENCE		
None or little	1,724	299
Moderate (1 to 3 years)	1,544	354
Experienced	1,797	433
Unknown	1,958	535
IMMEDIATE CAUSE OF ACCIDENT		
Fall/slip on rock	2,958	283
Slip on ice or snow	950	205
Falling rock, ice, or object	601	135
Exceeding abilities	525	30
Avalanche	278	125
Exposure	264	13
Illness (incl. pulmonary edema,		

Nut/chock pulled out

191

9

Appendix 4 Safety Check List

Designated safety coordinator: _____

- Safety procedures/requirements discussed with field personnel
- Copies of Safety Guidelines issued to field personnel
- Copy of latest Health & Safety Committee Annual Report read by field personnel
- Each proposed project checked to ensure compliance with minimum industrial First Aid requirements
 - First Aid Attendant
 - Equipment, including oxygen
- Number of personnel with First Aid training and in possession of firearms certification
- Evidence of recent medical/dental check provided by field personnel
- Regular Safety Review arranged in exploration camps

- Personal equipment owned by field personnel checked by project manager or designee to ensure it is adequate for jobsite
 - Boots, including adequate soles
 - Sleeping bags
 - Field knives
 - Raingear
 - Gloves
 - Headgear

- Equipment issued by Company to field personnel, as required
 - Goggles
 - Ear protection
 - Hard hats
 - Chainsaw pants
 - Any other required PPE

- Emergency/standard equipment issued to personnel for day pack
 - First aid kit
 - Emergency rations
 - Satellite phone
 - Survival manual, survival kit⁽¹⁾
 - Ground Positioning System (GPS)
 - Insect repellent
 - Sun screen
 - Space blanket
 - Map
 - Bear scares/repellent
 - Compass
 - EpiPen
 - Fire starter
 - Sunglasses
 - Waterproof matches/butane lighter

- Job site equipped with rifle/shotgun, ammunition, and person(s) fully certified and trained in use of firearms

⁽¹⁾

Appendix 5 – Recommended Survival Kits Cont'd.

Vehicle Travel Survival Kit

Clothing

- long underwear cut wristlet and anklet
- 2 pair clean wool socks
- wool pants
- layer type wool shirts and sweaters
- boots, not to be worn in warm car
- wool toque
- 2 pair clean mitts
- in winter, a warm sleeping bag for each occupant in case of a long wait for help in sub-zero weather

Equipment

- communication (cell, radio, and/or satellite phone),
- spare tire
- spare fuses
- screwdrivers
- pliers
- gas line
- de-icing fluid
- tire chains
- tow rope
- extension cord
- jumper cables
- extra gas
- engine oil
- anti-freeze
- shovel
- axe
- sharpening stone
- roll of brass wire
- wheel wrench
- shelter material - parachute and/or polyethylene sheet
- tent and/or canvas sheet
- stove, heat source
- candles
- fire extinguisher, mounted on side
- first aid kit
- flashlight, warning light or road flares
- barbecue starter fluid and dry kindling
- ready to eat foods and at least one thermos of hot soup or beverage
- Road salt or sand for winter conditions

Prepared by: AME BC Health & Safety Committee
800-889 West Pender Street, Vancouver BC V6C 3B2 www.amebc.ca/healthsafety.htm

Appendix 7

Procedures in the Event of a Serious Accident or Fatality

- Render all possible first aid.
- Arrange for local transfer of injured personnel, as required, to the nearest hospital.
Hospital Tel. No. _____
Air Charter Tel. No. _____
- If necessary, phone Medevac (in British Columbia, phone BCAS at **1-800-561-8011**) to coordinate air and land transfers of sick or injured personnel requiring transfer from one area to another (see p. 46).
- Phone RCMP in the event of any fatality.
Tel. No. _____
- Report accident to the Employer.
Day Tel. No. _____
Night Tel. No. _____
- Phone District Inspector of Mines.
Office Tel. No. _____
Home Tel. No. _____
- Report accidents to the nearest Workers' Compensation Board office (in British Columbia, reports must be submitted within 3 days of a claimed injury; fax reports to 604-233-9722 or 1-888-922-8803 or mail reports to PO Box 8940 Stn Terminal Vancouver, BC V6B 1H9). Check the appropriate Workers' Compensation Board's regulations concerning investigation and investigation requirements.
WCB Tel. No.
Lower Mainland, Vancouver Island, Terrace 1-888-967-5377
BC Interior and North 1-888-922-6622
Other: _____

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Appendix 8

Regulations Governing Mineral Exploration in BC

DISCLAIMER:

Although the Health & Safety Committee of AME BC has made every attempt to ensure that excerpts of laws and regulations quoted in these guidelines are current and accurate representations, the laws and regulations printed in the guidelines are not presented as official representations, and have not received official endorsement. For official interpretations of laws and regulations, please contact the relevant agency.

Workers' Compensation Act of British Columbia Occupational Health and Safety Regulation

<http://regulation.healthandsafetycentre.org/s/home.asp>

Part 4 General Conditions

Working Alone or In Isolation

4.21 Procedures

(1) The employer must develop and implement a written procedure for checking the well-being of a worker assigned to work alone or in isolation under conditions which present a risk of disabling injury, if the worker might not be able to secure assistance in the event of injury or other misfortune.

(2) The procedure for checking a worker's well-being must include the time interval between checks and the procedure to follow in case the worker cannot be contacted, including provisions for emergency rescue.

(3) A person must be designated to establish contact with the worker at predetermined intervals and the results must be recorded by the person.

(4) In addition to checks at regular intervals, a check at the end of the work shift must be done.

(5) The procedure for checking a worker's well-being, including time intervals between the checks, must be developed in consultation with the joint committee or the worker health and safety representative, as applicable.

(6) Time intervals for checking a worker's well-being must be developed in consultation with the worker assigned to work alone or in isolation.

Note: High risk activities require shorter time intervals between checks. The preferred method for checking is visual or two-way voice contact, but where such a system is not practicable, a one-way system which allows the worker to call or signal for help and which will send a call for help if the worker does not reset the device after a predetermined interval is acceptable.

4.22 Training

A worker required to work in the circumstances described in section 4.21(1) and any person assigned to check on the worker must be trained in the written procedure for checking the worker's well-being.

4.23 Annual review

The procedure and system for checking a worker's well-being must be reviewed at least annually, or more frequently if there is a change in work arrangements which could adversely affect a worker's well-being or a report that the system is not working effectively.

Ergonomics (MSI) Requirements

4.47. Risk identification

The employer must identify factors in the workplace that may expose workers to a risk of musculoskeletal injury (MSI).

Part 7 Noise, Vibration, Radiation and Temperature

Division 1 – Noise Exposure

7.2 Noise Exposure Limits. An employer must ensure that a worker is not exposed to noise levels above either of the following exposure limits:

- (a) 85 dBA Lex daily noise exposure level;
- (b) 140 dBA peak sound level.”

[Enacted by B.C. Reg. 382/2004, effective January 1, 2005.]

Part 8 Personal Protective Clothing and Equipment

General

to 1/2 hour before sunrise, or when persons or vehicles are not clearly discernible at a distance of 150 m (500 ft), must have and use lights to adequately illuminate

16.10 Rear view mirrors

(1) Mobile equipment must have a mirror or mirrors providing the operator with an undistorted reflected view to the rear of the mobile equipment or combination of mobile equipment, except as provided in subsections (1.1), (1.2) and (2).

Seat Belts

16.32 Provision

(2) Seat belts must be maintained in good condition.

16.33 Use

(1) If mobile equipment has seat belts required by any law in British

- (a) will prevent significant load shift relative to the carrier under emergency stopping conditions, and
- (b) meets a standard acceptable to the Board.

Tire Servicing

16.47 Training

- (1) The employer must establish and implement safe work procedures for servicing mobile equipment tires, rims and wheels, including safe procedures for
 - (a) inspecting tire, rim and wheel components,
 - (b) mounting a tire to the rim and wheel, and inflating a tire,
 - (c) installing and removing tire assemblies from mobile equipment, and
 - (d) demounting tires from the rim and wheel assemblies.
- (2) Workers assigned to work on tires, rims and wheels must be trained in and follow the safe work procedures established under subsection (1).

Note: The following requirements for all-terrain vehicles are in addition to the other requirements for mobile equipment in this Part which also apply to ATVs. Any vehicle used off maintained roads, including an ATV, is required by section 16.3(6) to be appropriate and safe for the intended use.

All-Terrain Vehicles

16.49 Prohibited use

An all-terrain cycle must not be used in any occupational, industrial, or commercial workplace.

16.50 Modifications

A modification to an ATV which may affect its structural integrity or stability must be certified by a professional engineer.

16.51 Operator's manual

- (1) The operator's manual for an ATV must be kept in a secure place with the vehicle or at another location readily accessible to the operator.

(2) The operator must use an ATV in accordance with the instructions in the operator's manual.

16.52 Use on sloping ground

(2) If the manufacturer has not set limits for operation of the ATV on sloping ground, 5% is the maximum allowable slope unless the employer has developed and implemented written safe work procedures appropriate for any steeper slope on which the equipment is to be used.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

16.53 Operator training

(1) The employer must ensure that each ATV operator is properly trained in the safe operation of the vehicle.

(2) The training program for an ATV operator must cover

- (a) the operator's pretrip inspection,
- (b) use of personal protective apparel,
- (c) operating skills according to the ATV manufacturer's instructions,
- (d) basic mechanical requirements, and
- (e) loading and unloading the vehicle, if this is a job requirement.

16.54 Personal protective equipment

(1) An ATV operator and any passenger on an ATV must wear eye protection as required by Part 8 (Personal Protective Clothing and Equipment), and hearing protection meeting the requirements of Part 7 (Noise, Vibration, Radiation and Temperature).

(2) An ATV operator and any passenger on an ATV must wear

- (a) clothing suitable for the environmental conditions, and
- (b) when necessary to protect against the hazards presented at the worksite, suitable gloves and clothing which covers the ankles and legs and the arms to the wrists.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

16.55 Loading and unloading

(1) Loading and unloading of an ATV onto or off a carrier vehicle must be done in a safe manner.

(2) If ramps are used when loading or unloading an ATV, they must be

placed at a suitable angle, be sufficiently wide and have a surface finish which provides an adequate grip for the ATV's tires.

Part 17 Transportation of Workers

Marine Craft

17.17 Safety standards

A vessel used to transport workers must meet generally accepted

- (b) ballasting, and
- (c) existing and forecast weather conditions.

[Enacted by B.C. Reg. 381/2004, effective January 1, 2005.]

17.24 Maintenance and inspection

- (1) A vessel must be inspected before initial use to ensure that it is fit for safe operation, and after that at intervals that will prevent the development of unsafe conditions.
- (2) Defects must be reported immediately, in writing, to the supervisor, employer or owner and those defects which affect the safe operation of the vessel must be remedied before the vessel is put to further use.

[Enacted by B.C. Reg. 381/2004, effective January 1, 2005.]

Part 19 Electrical Safety

Working on Low Voltage Electrical Equipment

19.10 Disconnection and lockout

- (1) Low voltage electrical equipment must be completely disconnected and locked out as required by this regulation before starting work on it.
- (2) Except as specified in subsection (3), if it is not practicable to completely disconnect low voltage electrical equipment, work must be performed by qualified and authorized workers and in accordance with written safe work procedures which
 - (a) require the use of appropriate electrical protective equipment, including rubber gloves and cover up, and other necessary live line tools,
 - (b) provide that, if practicable, uncontrolled liquid is not permitted

which explosives or safety fuses, fuse lighters, igniter cords or connectors are stored.

(2) At the loading site, detonator products must be stored separately from other explosives, and in a crush resistant box which is clearly identified.

21.17 Worksite storage

Explosives at the worksite must be guarded or contained in secured day boxes until used or returned to storage magazines.

21.18 Communication

(1) The employer must ensure that the location of a magazine in which explosives are stored, and any restrictions on access or activity around the magazine area, are clearly communicated to all workers.

(2) A day box and receptacle used for day storage of explosives on a work site must, when they contain explosives, display signs indicating the presence of explosives in a conspicuous manner, and the signs must be removed when they are empty.

explosives.

21.21 Separate handling

Blasting explosives and detonator products must be kept and handled separately until the last most practicable moment, before bringing them together.

Transportation

21.22 Vehicle operation

(1) A vehicle being used to transport explosives must be in sound mechanical condition, suitable for, and capable of, safely transporting explosives.

(2) Passengers, other than those assigned to assist in handling explosives, are not permitted on a vehicle transporting explosives.

21.24 Transportation of explosives

The transporting vehicle must not exceed 90 kilometres per hour (55 mph) on the highway.

21.30 Vehicle load limit

A vehicle transporting explosives must not be operated or permitted to operate if the load to be transported exceeds 80% of the manufacturer's rated carrying capacity for the vehicle.

21.31 Firefighting equipment

(1) A conveyance transporting explosives must be equipped with at least 2 fire extinguishers, of a type capable of quickly extinguishing gasoline, oil, or electrical fires.

(2) The fire extinguishers must be readily available for use and must have

(a) a minimum 5 BC rating for a vehicle with up to 2 000 kg (4 400 lbs) gross vehicle weight (GVW) rating, and

(b) a minimum 10 BC rating for a vehicle with more than 2 000 kg (4 400 lbs) GVW rating.

Handling Explosives

21.37 Defective explosives

Explosive materials or accessories which have deteriorated, or are believed to be defective, must not be used and must be handled and disposed of in a safe manner following the manufacturer's recommendations.

21.40 Ignition sources prohibited

(1) Smoking is prohibited within 15 m (50 ft) of where explosives are stored, being handled, or are in loaded holes.

(2) Open flame ignition sources must not be permitted within 15 m (50 ft) of where explosives are stored, being handled, or are in loaded holes, unless the blaster of record gives consent.

Part 29 Aircraft Operations

General Requirements

29.3 Pre-job planning and training

The employer must

Health, Safety and Reclamation Code for Mines in British Columbia

www.em.gov.bc.ca/Mining/Healsafe/mxready/mxcode01.htm

Part 1 Application of Code and General Rules

1.8.1 The manager shall

- (1) except for protective footwear and prescription eyeglasses, supply properly fitted personal protective equipment as required by the code,
- (2) ensure that workers are instructed in the use and maintenance of the equipment, the reasons for it, and also on its location and limitations, and
- (3) ensure that the equipment is adequate for its purpose.

1.8.2 All persons shall wear the personal protective equipment as required by the code.

1.11.1 The manager shall ensure that

- (1) workers are adequately trained to do their job or are working under

could produce a harmful reaction if combined, are adequately separated.

2.6.1 Any machinery or equipment which, when operating, exposes the operator or persons in the vicinity to noise levels in excess of those prescribed in Table 2-2, Part 2, for unprotected ears, shall, if practicable, be fitted with a properly maintained muffler or other noise reducing device.”

Table 2-2, Part 2 is reprinted below:

Examples of equivalent levels to 85 dBA for 8 hours:

Length of Exposure	Average Noise Level
16 hours	82 dBA
12 hours	83 dBA
10 hours	84 dBA
8 hours	85 dBA
4 hours	88 dBA
2 hours	91 dBA
1 hours	94 dBA
½ hours	97 dBA
¼ hours	100 dBA

2.9.1 Where the equipment, work procedure, or working condition in a work area has caused injurious inflammation of muscles, tendons, or bursae of the upper limbs of the persons doing the work, and it is

3.1.2 No person shall possess intoxicating liquor, or illegal drugs in or about a mine.

3.2.3 When a worker is working alone and may not be able to secure assistance in the event of an injury or other misfortune, the manager shall ensure that a means exists for checking the well-being of the worker and that the interval between checks does not exceed 2.5 hours.

3.6.1 The manager shall provide and maintain first aid supplies and services as required by the Workers Compensation Board.

3.8.2 Survival Rescue Procedures

(1) The manager of an underground mine shall establish a training program in survival mine rescue, including the use of approved self-rescue apparatus, and the use of fire fighting equipment in place at his mine.

(2) All persons, employed at the mine or not, shall be instructed and trained in these procedures before entering the underground mine.

3.9.1 Fire Fighting

(1) The manager shall ensure that fire fighting equipment is provided and maintained at all locations at the mine where fire may endanger life.

(2) Unless specified otherwise in this code, The British Columbia Fire Code 1998 and subsequent supplements and revisions shall apply in determining the level of fire fighting equipment and maintenance as prescribe in subsection (1).

Part 4 Building, Machinery, and Equipment

4.7.1 Trackless diesel-powered equipment for use in

(1) Underground coal mines shall comply with CSA Standard CAN/CSA-M424.1-88, "Flame-Proof Non-Rail Bound Diesel-Powered Machine for Use in Gassy Underground Coal Mines" except where such equipment is not used for cutting, digging and loading of coal the manager shall provide procedures submitted to the chief inspector.

4.17.1 All excavation work shall be carried out in accordance with the written instructions of a professional engineer where

- (1) the excavation is more than 6 m deep,
- (2) timber shoring is used in excavations exceeding 3.7 m in width, or
- (3) improvements or structures adjacent to the excavation could endanger persons, or
- (4) the excavation is subjected to vibration or hydrostatic pressure.

Part 6 Mine Design and Procedures

6.2.1 (1) The manager shall give 10 days notice to an inspector of intention to start work in, at, or about a mine, including seasonal reactivation.

Part 8 Explosives

8.4.2 A vehicle used to transport explosives shall

- (1) have a separate compartment for the explosives which prevents them from coming into contact with any metal that could produce a spark,
- (2) be constructed so that the explosives cannot fall from the vehicle,
- (3) when carrying explosives, be provided with orange diamond-shaped placards and clearly visible signs marked "Explosives" in letters not less than 150 mm in height which are posted on the front, rear, and sides of the vehicle,
- (4) not be refueled when carrying explosives, except in an emergency,
- (5) have its engine shut off while loading or unloading explosives except where the vehicle uses an engine-powered device for loading and unloading the explosives,
- (6) only be operated by an authorized person, and
- (7) be equipped with suitable fire extinguishing equipment.

8.4.3 A vehicle used to transport explosive material at a mine shall only carry detonators when the detonators are separated from other explosives by a solid partition of wood 15 centimetres thick and extending at least 15 centimetres above the highest level to which explosives are packed in the vehicle.

Part 9 Exploration

9.3.1 In addition to complying with the emergency preparedness provisions of Part 3 of the Code

- (1) active exploration sites of mechanical disturbance shall be equipped with a minimum Level-2 first aid kit, a stretcher and an epinephrine auto injector, and have provision made for continuous and consistent emergency communication, and
- (2) at exploration drill sites, at least two members of the drill crew shall have a valid Worker's Compensation Board Level 1 or equivalent first aid certificate unless the work site is accessible in all weather conditions and within 5 minutes of a facility where there is a qualified first aid attendant.

9.3.2 All persons employed at an exploration site shall be trained in accordance with Section 1.11, including where applicable

- (a) safety with respect to wildlife,
- (b) wearing of appropriate clothing,
- (c) use of personal protective equipment,
- (d) need for and use of suitable equipment to avoid becoming lost,
- (e) safety procedures to be adopted for boat handling operations, and
- (f) safe practices when working in or around aircraft, including effective communication.

9.3.3 Pits, Trenches & Excavations

- (1) No person shall be permitted to enter any excavation over 1.2 metres in depth unless
 - (a) the sides of the excavation are sloped to a safe angle down to 1.2 metres from the bottom of the trench, or
 - (b) the sides have been supported according to the requirements of Part 4 of this Code.
- (2) When it is required for persons to enter an excavation the minimum width of an excavation shall be such that a person is able to turn around without coming into contact with the sides.
- (3) Excavated material shall be kept back a minimum distance of 1 metre from the edge of any trench. excavation, and 1.5 metres from any other excavation.

✓ where the flight is conducted under Subpart 2 or 3, or is conducted using a helicopter, 60 hours in any 7 consecutive days; or
✓ where the flight crew member conducts single-pilot IFR flights, 8 hours in any 24 consecutive hours.

Division II - Standards for Flight Time and Flight Duty Time Limitations and Rest Periods

720.15 F ✓ ✓

The standards for increasing the flight time limitations for flight crew members are:

(1) Where the flight is conducted under Subpart 2 or 3 of Part VII of the or with a deHavilland DHC-6 aircraft not conducting a scheduled passenger service or with a helicopter not conducting a scheduled passenger service or heli-logging, for any 6 non-overlapping periods of 30 consecutive days within a 365 consecutive day period, the maximum flight time in any aircraft shall not exceed:

- ✓ where the flight crew member conducts single-pilot IFR operations, 8 hours in any 24 consecutive hours;
- ✓ 60 hours in any 7 consecutive days;
- ✓ 150 hours in any 30 consecutive days;
- ✓ 210 hours in any 42 consecutive days;
- ✓ 450 hours in any 90 consecutive days;
- ✓ 900 hours in any 180 consecutive days;
- ✓ the accumulated 30-consecutive day, 42-consecutive day and 90 consecutive day flight times may be reset to zero if the flight crew member is provided with at least 5 consecutive days free from all duty; and
- ✓ 1200 hours in any 365 consecutive days.

Canadian Transportation Accident Investigation and Safety Board Act

<http://laws.justice.gc.ca/en/C-23.4/SOR-92-446/index.html>

Mandatory Reporting - Reportable Aviation Accidents and Incidents

6. (1) Subject to subsection (5), where a reportable aviation accident or incident takes place, the owner, operator, pilot-in-command, any crew member of the aircraft and, where the accident or incident involves a loss of separation or a risk of collision, any air traffic controller having direct knowledge of the accident or incident shall report to the Board as much of the information listed in subsection (2) as is available, as soon as possible and by the quickest means available.

(2) The report referred to in subsection (1) shall contain the following information:

- (a) the type, model and nationality and registration marks of the aircraft;
- (b) the names of the owner, operator and, where applicable, the hirer of the aircraft;
- (c) the name of the pilot-in-command;
- (d) the date and time of the accident or incident;
- (e) the last point of departure and the point of intended landing of the aircraft, including the date and time of the departure;
- (f) where the aircraft is not missing or is not inaccessible,
 - (i) the location of the accident or incident by reference to an easily defined geographical point, or by latitude and longitude,
 - (ii) the number of crew members, passengers and other persons that were killed or sustained a serious injury,
 - (iii) a description of the accident or incident and the extent of any resulting damage to the aircraft, the environment and other property, and
- (iv) a description of any dangerous goods on board, or released from, the aircraft;
- (g) where the aircraft is missing or inaccessible,

- (i) the last known position of the aircraft by reference to an easily defined geographical point, or by latitude and longitude, including the date and time of that position,
 - (ii) the number of crew members and passengers on board the aircraft,
 - (iii) a description of any dangerous goods carried on board the aircraft, and
 - (iv) the action being taken to locate, or gain access to, the aircraft; and
 - (h) the name and address of the person making the report.
- (3) In addition to the reporting requirements set out in subsection (1), the person making the report shall, in a form approved by the Board, submit to the Board within 30 days after the accident or incident all the information required by subsection (2), unless otherwise exempted by the Board pursuant to subsection (4).
- (4) The Board may exempt a person from submitting the information referred to in subsection (3) where the Board has gathered the information through its own investigation of the accident or incident.
- (5) Where any person required to do so pursuant to subsection (1) makes a report to the Board, no other person referred to in that subsection is required to make a report.

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