AVALANCHE NEWS NO. 23

FEBRUARY 1987

EDITORIAL NOTE

The intention of AVALANCHE NEWS is to assist communication between persons and organizations engaged in snow avalanche work in Canada. Short articles cover reports of accidents, upcoming and past events, new techniques and equipment, publications, personal news, activities of organizations concerned with avalanche safety, education and research.

The editor welcomes and expects contributions; all reasonable comments and discussions will be printed. The articles in AVALANCHE NEWS reflect the views of the authors, and only when it is specifically stated do they represent the opinion of the Canadian Avalanche Association.

No paid advertisements are carried. Suppliers who wish to draw attention to their products should send information to the editor who will publish a note when the equipment has value in avalanche work and safety.

AVALANCHE NEWS is issued three times per year, usually in February, June and October. There is no subscription fee. Requests for copies and notifications of changes of address should be sent to the publisher.

Editor: Peter Schaerer
National Research Council of Canada
3650 Wesbrook Mall
Vancouver, B.C. V6S 2L2

Telephone: (604) 666-6741

Publisher: Geoff Freer
Snow Avalanche Section
Ministry of Transportation and Highways
940 Blanshard Street
Victoria, B.C. V8W 3E6

Telephone: (604) 387-6361

AVALANCHE NEWS
Canadian Avalanche Association, 3650 Wesbrook Mall, Vancouver B.C., V6S 2L2

AVALANCHE ACCIDENTS IN CANADA 1979-1986

by Paul Anhorn
National Research Council of Canada

The Avalanche Centre of the National Research Council has collected avalanche involvement reports since the winter of 1979/1980. Many organizations and individuals have mailed the completed cards. We wish to thank all those who have submitted reports; their efforts are greatly appreciated. It is hoped that statistics like the following will draw attention to avalanche dangers.

A total of 318 persons were reported to be caught in avalanches in Canada during this seven year period. One hundred and one people remained on the surface while 140 were partially buried. Some of the above 241 victims sustained injuries but all of them survived.

Thirty-two persons were completely buried and survived because somebody close-by was quick enough to locate and dig them out in time. Twenty-three of the completely buried victims were found in less than 10 minutes, 5 were dug out within 15 minutes and the longest completely buried survivor was dug out after one half of an hour. None of the above persons were protected by structure or vehicle, but one caterpillar operator survived his complete burial for 2 1/2 hours, well protected by the cage of his cat.

Unfortunately 45 people died in avalanches. Twelve were fatally injured during their descent. Suffocation was the main cause of death. Twenty-eight people were completely buried and died from lack of oxygen even though 11 of them were found and dug out within thirty minutes! Organized rescue groups found victims as late as 28 hours after the accident. Of the remaining 5 avalanche victims the cause of death is unknown.

The statistics show that, as a rough average, only one of every 7 persons caught by an avalanche was killed. However, a completely buried victim has only one chance in two to survive. Of 70 people completely buried, only 32 survived. Anybody buried longer than half an hour did not survive. Therefore remember: THERE IS LESS TIME THAN YOU THINK.

AVALANCHE INVOLVEMENT REPORTS

by Peter Schaerer
National Research Council of Canada

The Avalanche Research Centre of the National Research Council continues to collect information about all encounters of persons and equipment with avalanches in Canada. The objective is to obtain statistics about the extent and type of avalanche problems in Canada. Summaries of the data are expected to draw attention to avalanche dangers and to assist in the development of safety measures. Although fatal accidents receive most attention and make the newspapers, it is equally important to know the number of close-calls and the circumstances of lucky escapes. Summaries of avalanche involvements are published annually in the June issue of Avalanche News.

The collection of statistics on avalanche involvements requires the co-operation of everyone in the avalanche business and those travelling in terrain subject to avalanches. We request that anybody who was involved with an avalanche, or has witnessed or heard about an avalanche encounter this winter transmit the information in writing or by word of mouth to the Avalanche Research Centre of the National Research Council of Canada. A short form has been designed for this purpose and is attached to this issue of Avalanche News. The form, together with explanations on how to fill it out, was also printed in the Guidelines for Weather, Snowpack, and Avalanche Observations. For reporting an involvement detach the form and copy it. You may also request additional copies from me, use the old card-type forms, simply write down the information on a piece of paper and submit it, telephone or mention it during a conversation. The message is important, but not the format.

No names need to be mentioned, not even the location needs to be specific. All the information is kept confidential and will be released in summary form only.

For reporting an avalanche, the following are addresses of the National Research Council.

P.O Box 2759
Revelstoke, B.C.
V0E 2S0

Telephone: (604) 837-2435 (Paul Anhorn)

3650 Wesbrook Mall
Vancouver, B.C.
V6S 2L2

Telephone: (604) 666-6741 (Peter Schaerer)
(604) 666-8046 (Dave McClung)

Note that the old reporting cards contain an old, invalid address.

INTERNATIONAL SNOW SCIENCE WORKSHOP

OCTOBER 22-25, 1986

by Peter Schaerer

The bi-annual workshop and get-together of practical and theoretical avalanche workers took place October 22-25, 1986, at Squaw Valley, California. About 260 participants attended, listened to and discussed 34 presentations in the meeting room, viewed 20 poster sessions and exhibits of equipment, and inspected the Alpine Meadows ski area. Following are a few comments of interest to avalanche workers.

The presentations and discussions reaffirmed that consideration of avalanche hazards in the planning stage of facilities, and avoidance during travelling are the best preventive measures and therefore must receive strong attention. Techniques and equipment for making observations of the snow and its stability were described, but their application still relies on the skill and experience of an avalanche hazard forecaster.

Several speakers stressed the need for education of backcountry travellers. It was pointed out that part of this education should be available from centres that provide daily information about the avalanche hazard, but the centres should be staffed by knowledgeable people who are prepared to discuss snow stabilities. A study in Banff National Park showed that backcountry skiers have a good general education and are interested in learning about avalanches, and wish to obtain local information. The need for information was illustrated also in a description of an accident at Baxter State Park, Maine. The accident was the result of ignorance of avalanche hazards by a climbing party unfamiliar with winter conditions. A remarkable number of avalanche accidents involving skiers who have left organized and packed runs of ski areas was reported from France.

A general conclusion from the discussions was that professional avalanche personnel should share their knowledge to a greater extent by making available information and issuing avalanche hazard warnings.

The importance of taking into account avalanche hazards during the planning of facilities was illustrated with descriptions of the site of the 1988 Olympic Winter Games, avalanche hazards in Pakistan, unusually large avalanches in the Eastern Sierra Nevada, and avalanches from roofs of buildings. A strong need for developing data and experience that can be applied in the prediction of large design events and the delineation of hazardous areas is continuing.

The U.S. National Research Council of the National Academy of Sciences has organized a panel to make a realistic assessment of the extent of avalanche hazards and the physical, cultural, and economic impacts in the U.S.A. The report, intended to stimulate interest in avalanche protection, is in preparation.

Several papers dealt with measurements of snowpack properties. Research was reported regarding acoustic emissions, snow crystal growth and classification, layer identification, and measurements of the wetness, but much of it is unfinished.

The presentations at the workshop demonstrated that the high variability of the snowpack properties is a principal difficulty in describing the snowpack and making conclusions about its stability. Usually, the natural variability in the samples exceeds the accuracy of observation methods. The variation within an area was illustrated with a study of the effect of ground temperatures on snow stabilities at the Big Sky Ski Area, Montana.

Four speakers discussed the characteristics and application of rescue transceivers. At its meeting on September 28th, 1986, the International Commission on Alpine Rescue accepted the 457 kHz frequency for use as the standard transceiver frequency after 1990.

Advantages of the 457 kHz over 2275 Hz are a longer range of transmission with better possibilities of amplification, lower interference, and no feed-back problems when loudspeakers are used. Dual-frequency instruments have disadvantages of a greater power consumption because they transmit on both frequencies, and a low sensitivity that is determined by the 2275 Hz frequency.

At the Workshop it was pointed out that a search must maximize the probability of finding a buried victim and the probability of survival in an avalanche. Because of the short survival time a live recovery depends on the quick action of team members who have witnessed the accident.

Other presentations at the Workshop covered the prediction of snow drifting and precipitation, as well as the result of the trial of the accident at Alpine Meadows. The most intense discussions centred around the formation of the American Association of Avalanche Professionals, an organization similar to the Canadian Avalanche Association. The objectives and qualifications for membership stimulated hot debates during breaks.

Proceedings of the Workshop containing the papers and poster sessions will be available in the near future.

The next International Snow Science Workshop is planned for Whistler, B.C. in October 1988.

INTERNATIONAL SYMPOSIUM ON AVALANCHE FORMATION, MOVEMENT AND EFFECTS

Davos, Switzerland 14-19 September, 1986

by D. McClung, National Research Council

This symposium was the most important meeting on avalanche science and technology since the Grindelwald symposium on snow mechanics in 1974. About 70 papers were presented by representatives of the world's major groups (four contributions from Canada). A half day practical session was conducted on the last day (in German). A partial summary is given below.

Avalanche Dynamics

Two modelling approaches for predicting avalanche speeds were contrasted. The inadequacy of granular flow models based on a statistical description of particle collisions was demonstrated by K. Hutter. A continuum model for granular flow was introduced by H. Norem (Norway). This model has not yet been applied to avalanche data.

Complete velocity profiles for avalanche speeds along paths were provided by H. Gubler, using radar. These experiments included data on flow depths. The results are of great practical importance for engineering applications.

Avalanche Release

I presented a review paper on dry slab avalanche release and full depth avalanches caused by gliding.

Important field observations on avalanches caused by gliding were given by B. Lackinger. He showed that interaction of water and ground roughness is a key factor for release of these avalanches.

Avalanche Prediction

Application of expert systems (artificial intelligence) for future forecasting was described by J. Lafeuille (France).

The nearest neighbour method for numerical avalanche prediction was extended to include 3 days data to allow hazard build-up in the model (Baser, Butler, Good).

Avalanche Runouts and Defense

G. Brugnot (France) discussed the possible future use of expert systems for avalanche runout prediction.

A new model for avalanche run-up on barriers was presented (Hungr, McClung). The model predicts 50% higher run-up than the conventional method.

Snow Properties and Metamorphism

A review paper (S. Colbeck) summarized the current view of snowpack metamorphism.

Thermal convection was demonstrated for a very thin, cold snowpack in Alaska (J. Johnson).

Snow Stability

Paul Fohn gave two papers of practical interest: 1) analysis of the "Rutschblock" (failure of a mini-slab of 3 m^2 area) as a stability tool; 2) an attempt to extend the conventional stability index to include forces not present for natural events. Those papers will be of interest for operational personnel.

In addition to those topics, a wide variety of themes were explored, including even legal aspects. The proceedings are expected to appear late next fall in the red series of books from the International Association of Scientific Hydrology. This collection of papers will be a "must" for the serious student of avalanche technology.

INTERNATIONAL COMMISSION FOR ALPINE RESCUE

Submission by Peter Fuhrmann

The delegates of the International Commission for Alpine Rescue (IKAR) held their annual meeting on September 28, 1986, at Piasni Resinelli near Lecco, Italy. Following are extracts from the minutes of the meeting.

Recommendation of Single Frequency 457 kHz for Transceivers

At the meeting of delegates in Malbun in 1984, it was decided that IKAR would carry out comparative tests involving avalanche rescue transceivers' 2.275 and 457 kHz frequencies. It was also recommended that a decision be made at the end of 1986.

The results of the tests show that the 457 kHz frequency provided better results. In the meantime, in Germany under the DIN norm and in Austria under the Oe norm, the dual-frequency instruments were tested and accepted as the solution in the transition period until a single frequency instrument (457 kHz) could be made standard in 1990. In addition, tests were carried out in North America and these show that problems do not exist with the introduction of the single frequency of 457 kHz.

Based on the results of the tests and in conjunction with the DIN and Oe norm, IKAR recommends that the future single frequency for avalanche transceivers shall be 457 kHz.

The Avalanche Committee of IKAR accepted the 457 kHz frequency in a vote with fifteen for and one abstention.

Divining Rod

An unfortunate avalanche accident on March 5, 1985, involving a military manoeuver in Norway, resulted in 31 persons being buried. Fifteen persons were rescued, but the remaining sixteen died in the avalanche. A controversy involving various factions in the country developed as a result of the various search methods applied. The representatives of the Norwegian Red Cross (a member of IKAR) recommended the divining rod method. This, however, was rejected by the scientists of the University of Bergen and the Norwegian Geotechnical Institute. The scientific group felt that the likelihood of finding avalanche victims quickly is greater if the search is conducted with electronic transceivers.

IKAR was asked to render an opinion.

The IKAR stated that at no point in time was the divining rod recommended. Indeed, this method was demonstrated in Flaam, but the majority of rescuers viewed it with extreme skepticism.

The entire problem was discussed by the Avalanche Commission in detail. The following resolution was unanimously accepted:

"Until definite proof exists that the divining rod method is superior to other proven and used methods, it may not take priority over them."

Nils Faarlund (Norway) requested an amendment to that particular resolution. The request was rejected by P. Fuhrmann (Canada) and the rejection was supported by all other delegates.

Nils Faarlund objected to that rejection.

Avalanche Commission

The sub-commission avalanche glossary continues its work on the glossary.

The number of fatalities for the past year in all IKAR countries was 204. (During the previous year 226 persons lost their lives in avalanches.) Fifty percent were ski tourists, fifteen percent were skiers leaving the controlled ski area, and sixteen percent were mountaineers. There are 1,170 trained avalanche rescue dogs available within IKAR countries. Some of the avalanche accidents were discussed and valuable information was extracted.

The members of the Avalanche Commission recommended and nominated Francois Valla as Chairman, replacing Col. Guy de Marliave. Francois Valla was unanimously elected by the delegates.

CANADIAN AVALANCHE ASSOCIATION

Business

The activities of the Canadian Avalanche Association were promoted with a poster at the International Snow Science Workshop at Squaw Valley, October 22-25, 1986.

The directors of the Association met on December 15th, 1986, in Vancouver, B.C. They resolved that the list of active members be submitted to the coroners of British Columbia with the recommendation that persons be selected from this list when expertise is required concerning avalanche accidents. Guidelines drafted by Roger McCarthy for the investigation of accidents were approved. They were mailed to all members of the Association.

A notice to the press, drafted by Ken Newington was discussed and approved. The announcement, drawing the attention of the media to the Avalanche Association and the services which the members offer, was sent to the daily newspapers in Alberta and British Columbia.

Bruce Jamieson and Michael Boissonneault were accepted as active members.

Annual General Meeting

The Canadian Avalanche Association will hold its annual technical, social, and business meetings on May 6 and 7, 1987, at Kelowna, B.C. The principal topic of discussion shall be the objectives of making weather, snow profile and avalanche observations. Additional discussions will concern accidents and the recovery of buried victims. The active and associate members are requested to propose additional items for discussion.

AVALANCHE COURSES

FEDERATION OF MOUNTAIN CLUBS OF BRITISH COLUMBIA

Submitted by: Federation of Mountain Clubs of British Columbia, (FMCBC)

The FMCBC is organizing avalanche information courses on a basic and intermediate level at Vancouver and other locations.

Basic Avalanche Safety

2 days Saturday and Sunday

The FMCBC's standard winter course taken by 328 people these past two seasons. Suitable for all skiers and backcountry travellers, this two day course emphasizes the simple and practical methods of recognizing avalanche danger.

One day of theory, taught in the classroom, uses film, slides, maps, and aerial photographs to demonstrate all aspects of snow pack changes, wind and sun effects, safe route-finding, and rescue procedures.

Day two, on the mountain, covers snowpits, shovel-shear test, slope measurement, safe routes, probe search, and Pieps transceiver search.

Intermediate Avalanche Safety

2 1/2 days Friday (evening) Sat. & Sun. (overnight)

In response to a demand for a more advanced workshop on avalanche safety, this course was put together last season. The participants were very enthusiastic with the experience, particularly with the two days and overnight in the field.

If you have taken the Basic course and have extensive snow experience, good backcountry skiing ability, and a desire to know more about snow science, you should consider this new course. It is particularly suited to trip leaders or aspiring FMCBC course and trip leaders.

Cost: $75.00

Information, dates, and locations may be obtained from the Federation of Mountain Clubs of British Columbia, 1200 Hornby Street, Vancouver, B.C., V6Z 2E2, telephone: 687-3333.

ALBERTA AVALANCHE SAFETY ASSOCIATION

On December 8, 1986, the Alberta Avalanche Safety Association was incorporated under the Societies Act of the Province of Alberta.

The Association's mandate is to promote avalanche safety to individuals and groups pursuing the recreational activities of back-country skiing, snow/ice climbing and snowmobiling.

The Association is currently engaged in sponsoring and organizing Edmonton's second Alberta Avalanche Safety Symposium to be held on October 30, 31 and November 1, 1987.

Although the 1987 Symposium will be held in Edmonton, future symposia are being planned for other regions of the province.

The first directors of the Alberta Avalanche Safety Association are:

Jack DeBruyn - President
Cyril Shokoples - Vice-President
Bob Smerek - Secretary-Treasurer
George Weerdenburg - Director at Large
Judy Weir - Director at Large

Further information regarding the Association and the forthcoming Alberta Avalanche Safety Symposium can be obtained by contacting:

The Alberta Avalanche Safety Association
8711 - 62 Street
Edmonton, Alberta
T6B 1N5 Telephone: (403) 466-6485

CHANGE OF RESPONSIBILITIES AT MARMOT BASIN

by Karl Klassen, Avalanche Forecaster
Marmot Basin Ski-Lifts Ltd.

As of the 1986-87 season, Marmot Basin Ski-Lifts Ltd. is taking over the avalanche control operation at the Marmot Basin Ski area. Avalanche control was previously the responsibility of Jasper National Park, and carried out by a combined team of Park Wardens and Marmot staff.

Marmot is now responsible for all aspects of the avalanche safety program within the Marmot leasehold area. This includes research, analysis, forecasting, control and rescue operations. A safety plan for the program has been submitted to the Superintendant of Jasper National Park for approval.

Park Wardens will be present at Marmot as a part of the backcountry hazard forecasting system for Jasper Park. The avalanche control team and the wardens will share some of the facilities and equipment at the ski area.

It is anticipated that close ties with the Warden Service will be maintained in terms of rescue operations and of course, the sharing of information pertinent to avalanche hazard in the Jasper Park area. These ties should be beneficial to both our organizations.

Marmot Basin would like to extend an invitation to members of the Canadian Avalanche Association to drop in and visit the control operation at Marmot if they are in the area.

STANDPIPE PRECIPITATION GAUGE

Submitted by Ed Campbell
B.C. Ministry of Transportation and Highways

Extensive development and testing of a new style precipitation gauge over the past four years has produced promising results. Both the B.C. Ministry of Environment and the B.C. Ministry of Transportation and Highways, Snow Avalanche Section are presently using this new style of gauge.

An electronic pressure sensor indicates the depth of precipitation inside a standpipe gauge. This new gauge is accurate, reliable and relatively inexpensive to produce. It can also be easily configured to a variety of data collection platforms to be telemetered along with other remote weather station data.

Other gauges presently available suffer from a variety of problems including high purchase price, mechanical measuring problems, capping over, freeze up, poor catchment characteristics, a requirement for frequent servicing and varying degrees of telemetering capabilities.

The Standpipe Precipitation Gauge is a PVC plastic container which holds an antifreeze solution of Ethylene Glycol and water. As precipitation occurs the antifreeze solution melts any solid precipitation while rain simply collects in the container. An inexpensive, smooth walled, straight-sided container is mounted on a pedestal or tower. Presently, a gauge diameter of 370 millimeters is used. This diameter is expected to be sufficient to prevent or reduce capping over during periods of heavy snowfall. The electronic pressure transducer, threaded into the side of the gauge near the bottom, measures the deflection of a small diaphragm inside the transducer body caused by the liquid pressure. Depending on the type of transducer being used, measurements can be made to an accuracy of one or two millimeters water equivalent.

The two types of transducers presently being used are made by Sensotec and Viatran. The Sensotec Model TJE with a pressure range of 0-1 PSI gives a total gauge measuring capacity of 703 mm of water. This transducer has a 12 volt D.C. input power requirement and a 0-5 volt D.C. output.

Due to the collection of a large volume of precipitation in the Standpipe Gauge resulting in dilution of the antifreeze solution, it is necessary to install an inexpensive, submersible, circulating pump in the gauge. The pump circulates the stronger antifreeze solution from the bottom of the gauge upwards toward any weak concentration of solution or slush. If the pump is operated on an appropriate time cycle, freezing over of the solution will be prevented and the service interval of the gauge can be significantly increased.

Further information on the production and operation of this new style precipitation gauge can be obtained from the Snow Avalanche Section of the B.C. Ministry of Transportation and Highways.

PUBLICATIONS

Guidelines for Weather, Snowpack and Avalanche Observations

National Research Council of Canada, Technical Memorandum No. 132; revised edition 1986.
Price: $5.00

The guidelines applied in avalanche safety operations in Canada were slightly revised. They may be obtained from Publication Sales, National Research Council, Ottawa, K1A 0R6 (telephone: 613-993-2054) by pre-payment of the price with a cheque or money order (made to the Receiver General of Canada).

AVALANCHE RESOURCE AGENCIES

FEBRUARY 1987

1) AVALANCHE CONDITIONS, SEARCH AND RESCUE

The following agencies and individuals maintain continuous observations of the snow stability and avalanche hazards in their areas. They are also equipped for search and rescue work.

National Parks

Banff National Park:

Correspondence:

The Chief Warden
Banff National Park
P.O. Box 900
BANFF, ALBERTA T0L 0C0

Information concerning avalanche conditions:

Taped message on telephone: at Banff 403-762-3600
at Calgary 403-292-6600
Banff Wardens' office (open 24 hours per day)
Lake Louise Wardens' office 403-522-3866

Avalanche control offices at:

Sunshine Village	Telephone:	403-762-2693
Lake Louise	Telephone:	403-522-3982
Mt. Norquay	Telephone:	403-762-2640

Emergency telephone: 403-762-4506

Jasper National Park:

The Chief Warden
Jasper National Park
P.O. Box 10
JASPER, ALBERTA T0E 1E0

Warden Office (during office hours)	Telephone:	403-852-6156/6157
(24 hours)	Telephone:	403-852-6161

Glacier and Mount Revelstoke National Parks:

Correspondence:

The Superintendent
Glacier and Mount Revelstoke National Parks
P.O. Box 350
REVELSTOKE, B.C. V0E 2S0

Information concerning avalanche conditions:

Parks office at Revelstoke	Telephone: 604-837-5155
Information office at Rogers Pass	Telephone: 604-837-6274

Search and rescue:

The Chief Warden, Revelstoke	Telephone: 604-837-5155
Wardens' office, Rogers Pass	Telephone: 604-837-6274

Yoho National Park
Box 99
FIELD, B.C. V0A 1G0 Telephone: 604-343-6467

Attention: Chief Park Warden

Kootenay National Park
Box 220
RADIUM HOT SPRINGS, B.C. V0A 1M0 Telephone: 604-347-9615

Attention: Chief Park Warden

Waterton Lakes National Park
WATERTON, ALBERTA T0K 2M0 Telephone: 403-859-2352

Attention: Chief Park Warden

Kluane National Park
Haines Junction
YUKON Telephone: 403-634-2251

Attention: Chief Park Warden

British Columbia Ministry of Transportation
and Highways

Geoff Freer, Head
Snow Avalanche Section
940 Blanshard Street
VICTORIA, B.C. V8W 3E6 Telephone: 604-387-6361

Janice Johnson
Snow Avalanche Section
940 Blanshard Street
VICTORIA, B.C. V8W 3E6 Telephone: 604-387-6361

Jim Bay
Snow Avalanche Section
940 Blanshard Street
VICTORIA, B.C. V8W 3E6 Telephone: 604-387-6361

District Avalanche Technicians:

Gordon Bonwick
1690 Main Street
NORTH VANCOUVER, B.C. V7J 1E3 Telephone: 604-987-9311

Ed Campbell
Box 579
HOPE, B.C. V0X 1L0 Telephone: 604-869-2401

Jack Bennetto
Bag 4500
MERRITT, B.C. V0K 2B0 Telephone: 604-378-9359

Scott Aitken
Box 460
LILLOOET, B.C. V0K 1V0 Telephone: 604-256-4255

John Tweedy
P.O. Box 580
CRESTON, B.C. V0B 1G0 Telephone: 604-428-3242

Bruce Allen
1100 West 2nd Street Telephone: 604-837-7646
REVELSTOKE, B.C. V0E 2S0 or 604-837-7685

Michael Boissonneault
P.O. Box 490
STEWART, B.C. V0T 1W0 Telephone: 604-636-2625

Mike Zylicz
#300-4546 Park Avenue
TERRACE, B.C. V8G 1V4 Telephone: 604-638-3324

The Ministry of Transportation and Highways have trained personnel and rescue equipment on all mountain highways with avalanche problems.

Parks Branch of British Columbia Ministry of Environment and Parks

Parks & Outdoor Recreation Division
East Kootenay District
Box 118
WASA, B.C. V0B 2K0 Telephone: 604-422-3212

Parks & Outdoor Recreation Division
West Kootenay District
NELSON, B.C. Telephone: 604-825-4421

Parks Branch
(Alice Lake)
BRACKENDALE, B.C. V0N 1H0 Telephone: 604-898-3678

Alberta Recreation and Parks

Kananaskis Country Region
Box 280
CANMORE, ALBERTA T0L 0M0

Lloyd Gallagher - Alpine Specialist, Public Safety Co-ordinator	Telephone:	403-678-5508
George Field - Alpine Specialist	Telephone:	403-678-5508
Jock Richardson - Snow Study Observer	Telephone:	403-678-5508
Gavin More - Resource Specialist	Telephone:	403-678-5508
Peter Lougheed (Kananaskis) Provincial Park (7 days a week - 0800-1630)	Telephone:	403-591-7222
Bow Valley Provincial Park (Monday to Friday - 0800-1630, weekends on call)	Telephone:	403-673-3663
Elbow District (Monday to Friday - 0800-1630, weekends on call)	Telephone:	403-949-3754

Ski Areas

Whistler Mountain
Whistler Mountain Ski Corporation
Box 67
WHISTLER, B.C. V0N 1B0 Telephone: 604-932-3434

Attention: Brian Leighton

Red Mountain Ski Area
Box 939
ROSSLAND, B.C. V0G 1Y0 Telephone: 604-362-7384

Attention: Simon Walker

Fernie Snow Valley Ski Ltd.
Box 788
FERNIE, B.C. V0B 1M0 Telephone: 604-423-9221

Attention: Dave Aikens

Mt. Washington Ski Resort Ltd.
P.O. Box 3069
COURTENAY, B.C. V9N 5N3 Telephone: 604-338-1386

Attention: Tom Van Alstine

Whitewater Ski Society
Box 60 Telephone: 604-354-4944
NELSON, B.C. V1L 5P7

Attention: Rick Galliver

Blackcomb Mountain
P.O. Box 98
WHISTLER, B.C. V0N 1B0 Telephone: 604-932-3141

Attention: Ken Newington

Marmot Basin Ski Lifts Ltd.
P.O. Box 1300
JASPER, ALBERTA T0E 1E0 Telephone: 403-852-3816

Attention: Karl Klassen

Heli-Ski Operators

Hans Gmoser, Mark Kingsbury, Jeff Boyd, Kobi Wyss
Canadian Mountain Holidays
Box 1660
BANFF, ALBERTA T0L 0C0 Telephone: 403-762-4531

Ernst Buehler
Canadian Mountain Holidays, Cariboos
Box 1660 Prince George Mobile N699377
BANFF, ALBERTA T0L 0C0 "Cariboo Lodge"

Klaus Fux
Canadian Mountain Holidays, Valemount
VALEMOUNT, B.C. V0E 2Z0 Telephone: 604-566-4487

Dominic Neuhaus
Canadian Mountain Holidays, Monashees
MICA CREEK, B.C. V0E 2L0 Telephone: 604-834-7223

Buck Corrigan
Canadian Mountain Holidays, Revelstoke
REVELSTOKE, B.C. V0E 2S0 Telephone: 604-837-2107

Colani Bezzola
Canadian Mountain Holidays,
Bobbie Burns
Box 827
GOLDEN, B.C. V0A 1H0 Telephone: 604-346-3366

Walter Bruns
Canadian Mountain Holidays, Bugaboos
BANFF, ALBERTA T0L 0C0 Telephone: 604-346-3366

Panorama Heli-Skiing
Box 937
INVERMERE, B.C. V0A 1K0 Telephone: 604-342-6941

Rudi Gertsch
Purcell Helicopter Skiing
GOLDEN, B.C. V0A 1H0 Telephone: 604-344-5410

Peter Schlunegger
Selkirk-Tangiers Heli-Skiing
REVELSTOKE, B.C. V0E 2S0 Telephone: 604-837-5271

Allan Drury
Selkirk Wilderness Skiing
MEADOW CREEK, B.C. V0G 1N0 Telephone: 604-366-4424

Mike Wiegele
Wiegele Helicopter Skiing
BLUE RIVER, B.C. V0E 1J0 Telephone: 604-673-8344

BANFF, ALBERTA T0L 0C0 Telephone: 403-762-5548

Whistler Heliskiing
P.O. Box 258
WHISTLER, B.C. V0N 1B0 Telephone: 604-932-4105

Kootenay Helicopter Skiing
P.O. Box 717
NAKUSP, B.C. V0G 1R0 Telephone: 604-265-3121

Mining Companies

Crows Nest Resources Ltd.
Line Creek Mine (Upper Elk Valley)
P.O. Box 2003 Telephone: 604-425-2555
SPARWOOD, B.C. V0B 2G0 (24 hours)

Attention: Greg F. Allen

2) SEARCH AND RESCUE

The following agencies and individuals can assist in search and rescue work.

Dogs for Avalanche Search - Parks Canada

Alphie Burstrom
Jasper National Park Telephone: 403-852-6156 (Bus)
JASPER, ALBERTA T0E 1E0 403-852-3555 (Res)

Gordon Peyto
Glacier National Park Telephone: 604-837-6274 (Bus)
REVELSTOKE, B.C. V0E 2S0 604-344-5041 (Res)

Dale Portman
Banff National Park Telephone: 403-522-3866 (Bus)
LAKE LOUISE, ALBERTA T0L 1E0 403-522-3628 (Res)

Scott Ward
Banff National Park Telephone: 403-762-4506 (Bus)
BANFF, ALBERTA 403-762-2488 (Res)

Dogs for Avalanche Search - R.C.M.P.

The followings dogs and their masters have received special avalanche training:

Chilliwack Sub/Division

Cpl. Terry Barter Telephone: 604-792-4611

Cranbrook Detachment

Cpl. Gordon Burns Telephone: 604-489-3471

Courtenay Sub/Division

Cpl. Jim Brewin Telephone: 604-338-7421

Kamloops Sub/Division

Cpl. Wayne Murphy Telephone: 604-372-3130

Nanaimo Detachment

Cpl. Dale Marino Telephone: 604-754-2345

Penticton Detachment

Cpl. Gary McCormick — Telephone: 604-492-4300
Cst. R. C. Horton

Prince George Detachment

Cpl. Gary Gillette — Telephone: 604-562-3371
Cst. Al Soneff

Terrace Detachment

Cpl. Lothar Bretfeld — Telephone: 604-638-0333

Vernon Detachment

Cpl. Tim Boal — Telephone: 604-545-7171

For contacts ask for the R.C.M.P. Radio Room where the location of the dog handlers will be known.

The following detachments will take information and pass it on to the Alberta Provincial Parks:

R.C.M.P., Peter Lougheed (Kananaskis) Provincial Park — Telephone: 403-591-7707

R.C.M.P., Canmore — Telephone: 403-678-5516

R.C.M.P., Banff — Telephone: 403-762-2226

Provincial Emergency Program (Ministry of Attorney-General)

The British Columbia Provincial Emergency Program co-ordinates most local search and rescue groups in the Province. Enquiries can be directed to:

R.E. Neale, Director
Provincial Emergency Program
3287 Oak Street
VICTORIA, B.C. V8X 1P8 — Telephone: 604-387-5956

B. Thorshaug, Search & Rescue Co-ordinator
Provincial Emergency Program
3287 Oak Street
VICTORIA, B.C. V8X 1P8 — Telephone: 604-387-5956

Regional co-ordinators are located at:

Vancouver Island Region

	Mr. W.C. Dalley (Claude)	Telephone:	604-758-3951
(Bus)	2569 Kenworth Road		604-387-5956
	NANAIMO, B.C. V9T 4P7		(after hours-Victoria)
(Res)	7946 North Wind Drive		
	LANTZVILLE, B.C. V0R 2H0	Telephone:	604-390-4546

Lower Mainland Region

	Mr. F.G. Clegg (Frank)	Telephone:	604-584-6366 or
(Bus)	10334 152nd A Street		604-584-8822
	SURREY, B.C. V3R 7P8		(24 hours)
(Res)	6892 Centennial Drive		
	SARDIS, B.C. V0X 1Y0	Telephone:	604-858-9980

Northern Region

	B.C.E. Akehurst (Barry)	Telephone:	604-565-6395
(Bus)	1011 4th Avenue		604-565-6130
	PRINCE GEORGE, B.C. V2L 3H9		(after hours)
(Res)	753 Faulkner Crescent		
	PRINCE GEORGE, B.C. V2M 5E1	Telephone:	604-563-5531

Kootenay Region

	G. Hartley	Telephone:	604-354-6395
(Bus)	310 Ward Street		604-354-6399
	NELSON, B.C. V1L 5S4		(24 hours)
(Res)	#44 Boneventure Mobile Home Park		
	RR #1, Box 503		
	NELSON, B.C. V1L 5R3	Telephone:	604-825-9458

Invermere

	Columbia Mountain Rescue Group		
	A. Larson (Arnor), Co-ord.	Telephone:	604-342-6042 (Res)
	J. Hetherington, Deputy Co-ord.		604-342-9741 (Res)
	Box 399		
	INVERMERE, B.C. V0A 1K0		

Southern Interior Region

M.E. Dyer (Murray)
(Bus) 1259 Dalhousie Place
KAMLOOPS, B.C. V2C 5Z5
Telephone: 604-374-9717
604-372-3213
(24 hours)

(Res) 2478 Young Street
KAMLOOPS, B.C. V2B 4M8
Telephone: 604-376-3453

First Aid Ski Patrol

P.O. Box 2651
VANCOUVER, B.C. V6B 3W8

West Kootenay Rescue Group

Box 764
NELSON, B.C. V1L 5R4

To activate, call:

Nelson R.C.M.P.
Telephone: 604-352-3511

3) EDUCATION

Avalanche Centre, National Research Council

Peter Schaerer
3650 Wesbrook Mall
VANCOUVER, B.C. V6S 2L2
Telephone: 604-666-6741 (Bus)
604-987-3716 (Res)

Technical information.

British Columbia Institute of Technology

Industry Services
3700 Willingdon Avenue
BURNABY, B.C. V5G 3H2
Telephone: 604-432-8521 (Bus)

Courses for professional staff.

Outdoor Recreation Council of British Columbia

Suite 100, 1200 Hornby Street
VANCOUVER, B.C. V6Z 2E2
Telephone: 604-687-3333

Safety brochures and slide packages.

Federation of Mountain Clubs of British Columbia

1200 Hornby Street
VANCOUVER, B.C. V6Z 2E2 Telephone: 604-687-3333

Two day awareness courses.

Canadian Ski Patrol System

T. Simper
National Avalanche Training Officer
14 Knowles Place, Box 1117
OKOTOKS, ALBERTA T0L 1T0 Telephone: 403-938-2131

George Evanoff
Pacific North Division-Avalanche Officer
1960 Garden Drive
PRINCE GEORGE, B.C. V2M 2V8 Telephone: 604-564-7814

Awareness courses.

Herb Bleuer
P.O. Box 63
Pemberton, B.C. V0N 2L0 Telephone: 604-894-6994

Public awareness courses.

Avalanche Films

"Avalanche" - 50 minutes

Industrial Services Section
Ministry of Health
500 Lougheed Highway Telephone: 604-521-1911
PORT COQUITLAM, B.C. V3C 1J0 (Loc. 281)

"The Snow War" - 25 minutes

National Film Board
811 Wharf Street
VICTORIA, B.C. V8W 1T2 Telephone: 604-388-3868

National Film Board
1161 West Georgia Street Telephone: 604-666-0716 or
VANCOUVER, B.C. V6E 3C4 604-666-0718

National Film Board
545 Quebec Street
PRINCE GEORGE, B.C. V2L 1W6 Telephone: 604-564-5657

Backcountry Avalanche Institute

Box 1050
CANMORE, ALBERTA T0L 0M0 Telephone: 403-678-4102

Awareness courses.

Ptarmigan Tours

Box 11 Telephone: 604-427-2838
KIMBERLEY, B.C. V1A 2Y5 604-422-3270 (eve)

Awareness courses.

5) WEATHER OFFICES

Atmospheric Environment Service

Correspondence and equipment:

G.E. Wells
Acting Regional Director
1200 West 73rd Avenue
VANCOUVER, B.C. V6P 6H9 Telephone: 604-666-6399

D. Phillips
Acting Chief, Forecast Operations
Pacific Weather Centre
1200 West 73rd Avenue
VANCOUVER, B.C. V6P 6H9 Telephone: 604-666-0523

E. Coatta
Climate Information
1200 West 73rd Avenue
VANCOUVER, B.C. V6P 6H9 Telephone: 604-666-2980

Alberta Weather Office
Edmonton International Airport
EDMONTON, ALBERTA T5J 2T2 Telephone: 403-437-1250

LIST OF WEATHER OFFICES IN BRITISH COLUMBIA

LOCATION	OFFICER IN CHARGE	TELEPHONE (604)	OPEN HOURS (local time)
Vancouver	John Pashold	276-6109 Tape 273-8331	24 hours
Victoria	Norm Dressler	656-3377 Tape 656-3978	24 hours
Prince George	Earl Zilkie	963-7552 Tape 963-9330	0400-2100
Kelowna	Ralph Janes	765-6598 Tape 765-4027	0445-0015
Kamloops	Bryan Jensen	376-2160 Tape 376-3044	0700-1700
Fort St. John	Randy McCumsey	785-4304	0700-1700
Fort Nelson	Ian Lougheed	774-6461	0645-1645
Castlegar	Tom Willson	365-3131	0600-1600
Revelstoke		837-4164	0800-2200
Port Hardy	Roy Koch	949-6559	0715-1715
Penticton	Dale Richier	492-0539	0700-1700 (Mon.-Fri.) 0800-1600 (Sat.-Sun.)
Terrace	George Balkey	635-3224	0710-1710
Pacific Weather Centre		666-2728	24 hours

(The Pacific Weather Centre is the main contact during hours when the local weather offices are closed).

BANFF, ALBERTA	403-762-2088	0600-1700
WHITEHORSE, YUKON	403-668-2293	24 HOURS
ALBERTA WEATHER OFFICE	403-468-7931	24 HOURS

CHANGES

Changes, additions, or deletions to this list should be reported to the Snow Avalanche Section, British Columbia Ministry of Transportation and Highways.