AVALANCHE NEWS NO. 6

June 1981

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 or organizations concerned with avalanche safety, education and research. Contributions are expected from the readers.

Avalanche News is issued three times per year, usually in January, June and October. There is no subscription fee. Anybody wishing to obtain copies should request them from the publisher.

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AVALANCHE NEWS
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AVALANCHE INVOLVEMENTS IN CANADA

WINTER 1980 - 1981

The Avalanche Centre of the National Research Council received reports of 24 incidents in the winter of 1980 - 1981 either when persons were involved in avalanches or when property was damaged.

The incidents can be broken down as follows:

Skiers in a ski area	8 reports
Back country skiers	10 reports
Mountain climbers on foot	1 report
Personnel of industrial operations	2 reports
Vehicles on roads	2 reports
Buildings damaged	1 report
TOTAL	24 reports

Of these incidents 17 occurred in the Rocky Mountains, 5 in the Columbia Mountains, and 2 in the Coast Mountains.

The involvements with avalanches can be stratified as follows:

24 persons were caught by avalanches but remained at the surface;

14 persons were partially buried, which means a part of the body was visible on the surface when the avalanche stopped;

17 persons were completely buried;

2 vehicles were partially buried;

1 building was damaged.

Of the persons that were caught, partially buried, or completely buried, 9 were killed and 4 sustained injuries.

All the accidents which resulted in fatalities involved skiers and climbers in the back country.

On February 21 an avalanche swept a skier into a water hole at Twin Falls in Yoho National Park. The body was recovered 24 hours later by an organized rescue party in about 1 m deep water under 6 m deep avalanche snow.

On February 22 at Mount Thompson in Banff National Park two climber-skiers triggered an avalanche which buried them completely. They were found 23 hours later by a dog used by an organized rescue party. The dog took only five minutes to locate both victims under 1 m to 1.5 m deep snow.

On February 22 two skiers triggered an avalanche at Bourgeau Lake in Banff National Park. One skier was partially buried and survived, but the other one was buried 1 m deep and was found by probing by an organized rescue party five hours after the accident.

On February 23 three fatalities occurred in the Purcell Mountains. All three skiers were completely buried but were recovered with the aid of transceivers within 10 to 20 minutes after burial. In spite of the short burial time they were pronounced dead at the scene.

On April 2 two climbers on foot released a slab avalanche at Mount Stephen in Yoho National Park. The avalanche carried them over cliffs and icefalls, and carried one of the persons over a vertical distance of 300 m and the other one over 800 m. Neither climber survived the fall.

The only property damage reported was to the Conrad Kain Hut in Bugaboo Provincial Park. An avalanche--occurrence date unknown--had broken the front wall of the hut.

The weather of the winter of 1980 - 1981 in Western Canada had two characteristic features: the temperature was above average, and most of the precipitation fell in concentrated periods in December, mid-February, and April with long, dry periods in between. The result of the warm weather was a low amount of snowfall at the low elevations resulting in few and generally small avalanches on roads. The low avalanche activity in the valleys is reflected in the low numbers of damaged structures and accidents on roads.

Most accidents can be related to high instabilities when new snow had been deposited on snow surfaces that were subjected to extreme metamorphism during previous periods of clear weather. The most significant such situation was observed between February 13 and 21 when heavy snowfall occurred after a long period of dry weather. The snowpack remained unstable for several days after the end of the storm, which is reflected in the accidents with serious consequences which occurred during February 21 - 23.

We wish to thank all those who have submitted reports of avalanche involvements. It is expected that statistics like these will draw attention to avalanche dangers.

MEETING OF THE STAFF OF

AVALANCHE SAFETY OPERATIONS

On May 5 and 6, 1981 the senior field personnel of avalanche safety operations in Western Canada met in Banff for discussions of mutual problems. The meeting was attended by 54 persons representing ski areas, highway operations, mountain guiding operations, helicopter skiing operations, national and provincial parks, and information services.

The formation of an association and an avalanche centre was the principal topic of discussion. Those in attendance elected a steering committee and assigned to it the task of drafting a constitution and bylaws, having them approved by the authorities, and call a first membership meeting. The members of the steering committee are: Peter Schaerer, Walter Schleiss, Willi Pfisterer, Lloyd Gallagher, Herbert Bleuer, Chris Stethem, Geoff Freer, Roger McCarthy, and Jeff Boyd. The objectives of the association were defined as follows: to exchange technical information; to set standards for operations, the members of the association, and education; to organize professional avalanche courses; to promote public awareness programs. The association might also initiate the formation of an avalanche information centre in future years.

Active members of the association would be individuals who are involved in avalanche related activities on a full-time basis. Other persons who are not involved in avalanche work on a full-time basis or represent other interest groups would be invited to join as associate members.

Changes to the guidelines for making observations of the weather, snowpack, and avalanche occurrences were also approved at the meeting. An extensive discussion of the classification of avalanche sizes revealed that each classification has applicability and it would be difficult to find a universal system serving all the needs. It was decided to recommend the Canadian system which describes the avalanches according to their destructive potential and to supplement the information about each avalanche with the amount of snow moved relative to the potential of the terrain.

The guidelines for observations have been submitted for publication, but it would be optimistic to expect them to be available in print before the coming winter.

A working group was formed under the direction of Peter Fuhrmann with the task of standardizing and co-ordinating the electronic data storage and retrieval of observations of the weather, snowpack, and avalanche occurrences.

Helicopter skiing operators and others expressed a need for an exchange of information with other operations about the weather and snow stability on a real-time basis. The information is needed in particular when the weather does not permit flying to high altitudes. In such situations the guides often lose contact with the development of the snow stability. Jeff Boyd has assumed the task of investigating the feasibility of an information exchange system.

The case histories of the fatal avalanche accidents in Canada of this past winter were presented. Concern was expressed about the confidentiality of accident reports, and it was recommended that a detailed reporting form should be completed mainly for the records of those involved in the accident and be submitted to the National Research Council on a voluntary basis only.

AVALANCHE COURSES

In the winter of 1980 - 1981 the following operational courses were held jointly by the British Columbia Institute of Technology and the National Research Council:

	Number of Participants	
	Registered	Passed
December 1 - 5; Creston; Transportation and Industry 1	22	22
December 15 - 19; Creston; Transportation and Industry 1	24	24
December 6 - 12; Whistler; Ski Guiding 1	26	22
January 4 - 10; Creston; Ski Guiding 1	19	19
January 12 - 18; Creston; Ski Guiding 1	25	25
January 12 - 18; Jasper; Ski Areas 1	23	23
February 22 - 28; Nelson; Ski Areas 1	19	19
December 8 - 12; Creston; Transportation and Industry 2	17	17
December 14 - 20; Golden; Ski Guiding 2	16	14
January 24 - 31; Whistler; Ski Areas 2	16	11
December 1 - 3; Rogers Pass; Refresher for Guides	9	8
February 11 - 13; Lake Louise; Refresher for Park Wardens	11	11
Total number of participants	227	215

These courses were intended for personnel engaged in avalanche safety operations, but were attended by a great number of students who had no professional interest. Many participants expressed the wish for week-long courses that would concentrate on the needs of the private back country travellers rather than the professional guide. At a meeting of avalanche course instructors on May 4, 1981, it was decided that such courses should be organized by private industry rather than by B.C.I.T.

The staff who has organized the B.C.I.T./N.R.C. courses in the past plans to draft guidelines of the objectives and the standards of the courses for private snow travellers.

AVALANCHE DOGS

Presently no special training and examination for private avalanche dogs and their masters is available in Canada, but several dog owners are interested in training and using their dogs for avalanche work. In order to meet this need an avalanche dog course is planned for the winter of 1981 - 1982. All those wishing to attend the course should contact either Art Twomey, P.O. Box 11, KIMBERLEY, B.C., V1A 2Y5, telephone (604) 422-3270; Rod Pendlebury, P.O. Box 364, FERNIE, B.C., V0B 1M0; or Lloyd Gallagher, Kananaskis Park, Box 32, CANMORE, Alberta, T0L 0M0, telephone (403) 678-5508. Prerequisite for attending the course is that the dog is already trained in obedience.

SNOW WARS IN THE NATIONAL PARKS OF CANADA

Have you see the film "Rogers Pass"? In one scene the then B.C. Highways Minister pounds his desk and says in his most authoritative voice, "That's where we're going", meaning the Trans-Canada Highway would be built over Rogers Pass. This decision launched Parks Canada into "Snow Wars".

In 1956 the first troops, led by Noel Gardner and Peter Schaerer, advanced to the battleground. The enemy was observed, measured, weighed, sheared, skied, evaluated, and shot at, so that by 1962, when the highway opened, the advance guards of the human race were ready to defend their intrusive spearhead against the repossessive efforts of mother nature.

The war still rages on. Not every battle is won, but the new troops, led by Fred and Walter Schleiss, and assisted by modern science and technology are winning.

Forty-three and one-half (43.5) km of highway are controlled and there are 95 avalanche paths where avalanches can hit the Trans-Canada Highway, the Canadian Pacific Railway, or both.

The forecasting team consists of two forecasters, two observers, and five assistants who have an elaborate data collecting system at their disposal. Fully equipped observation sites manned 24 hours per day are at Rogers Pass (1310 m) and Mt. Fidelity (1905 m), where regular snow and weather readings are taken daily at 7 a.m. and 4 p.m. and interval readings are taken when required. Telemetry stations McDonald Shoulder (1900 m), Hermit Hut (1900 m) and Round Hill (2110 m) send air temperature, humidity, wind speed and direction continuously to Rogers Pass Centre. Snow profiles and weekly weather observations are taken at Mt. Abbott (2100 m) and other field readings as required.

The mountain weather forecast is received twice daily from the Pacific Weather Centre at Vancouver. With all this information on hand, the forecasters assess the avalanche hazard. If the hazard to the highway becomes a distinct possibility, a yellow warning form is issued, which puts all resources on standby. Motorists are warned at the Park entrances. If the hazard becomes acute, a red action form is issued and the highway will be closed, usually in sections. The snowpack is stabilized with a 105 mm Howitzer, operated by a platoon of the Canadian Forces.

These Snow Wars of Rogers Pass spilled over to the National Parks in the Rocky Mountains in the years after 1960.

The access road to the Sunshine ski area near Banff crosses 14 avalanche paths over a distance of 12 km. After using mortars for avalanche control with moderate success, bombing from helicopters and preplaced, remotely controlled explosive charges were adopted.

Control measures used at the Sunshine Ski Area are: permanent closures, foot packing, ski stabilization, hand charges, a mobile avalauncher, and occasionally helicopter bombing. The ski area is expanding and therefore will require more extensive control in the future. At the present time the avalanche control of the Sunshine Ski Area and the road is carried out by the park wardens who have a study plot at Sunshine (2200 m). Regular snow and weather readings are taken at 8 a.m. and 3 p.m. daily. Future plans are for a telemetry station at the 2700 m level for temperature, humidity, wind, and precipitation readings.

The Banff - Windermere Parkway is subjected to avalanches by 14 paths. Control methods used are closure of the highway and bombing from helicopters. Future plans may include relocation of the highway to avoid avalanche paths. The control job is handled by two park wardens who have available a study plot at Marble Canyon (1460 m) where snow and weather readings are taken every 24 hours at 8 a.m. These are supplemented by shear tests, short profiles, and weekly readings near the Mt. Assiniboine lookout (1280 m).

In Yoho National Park the Trans-Canada Highway is exposed to four Mt. Bosworth avalanche paths over a distance of 1 km. Two park wardens look after this problem. A study plot at 1600 m provides readings twice daily at 8 a.m. and 4 p.m. In addition to the Bosworth readings and profiles, snow profiles are taken at Lake O'Hara and Little Yoho Valley for a general hazard forecast for back country users. Control measures used are similar to those used in Rogers Pass: a yellow warning form and a red action form are issued, and the snowpack is stabilized by helicopter bombing. In the future, the use of some preplanted charges in the avalanche starting zones is planned.

The Mt. Norquay Ski Area near Banff is patrolled by two park wardens. Control measures used are permanent closures, foot packing, hand charges, and helicopter bombing.

Lake Louise is the largest ski area in the National Parks. The avalanche control is carried out by seven park wardens assisted by three professional ski patrollers. Control measures used include permanent closures, ski stabilization, foot packing, hand charges, five fixed and one mobile avalaunchers, and occasionally bombing from a helicopter. Snow and weather readings are taken daily at 7:30 a.m. and 4 p.m. at the Temple study plot at the 2000 m level. A telemetry station on Mt. Whitehorn sends air temperature, humidity, wind speed and direction continuously to the control office at Temple. Snowpack profiles are taken on various other sites. The mountain weather forecast is received from Edmonton twice daily. The future plans include a computerized data storage and retrieval system with the ultimate aim of a computer assisted hazard evaluation in co-operation with the avalanche control staff at Sunshine and some outside agencies.

The Icefields Parkway from Lake Louise to Saskatchewan River Crossing, a distance of 72 km, has 11 avalanche paths. Control measures used are road closures, avalauncher for the lower targets, and helicopter bombing for the high triggers. Two sites are loaded with preplanted charges. Profiles and readings are taken weekly at Bow Summit (2100 m). These readings are also used for the back country hazard awareness program. The Lake Louise team is in charge of the parkway forecast and control.

Forty avalanche paths empty onto the northern part of the Icefields Parkway between Saskatchewan Crossing and Sunwapta Pass. This 57 km long section is maintained by Jasper National Park with four wardens looking after the avalanche control. A study plot is located at Parkers Ridge (2033 m), where snow and weather readings are taken at 8 a.m. every day and profiles done bi-weekly. Additional snow readings and profiles are taken as required at Camp Coleman (1530 m). Control measures used include road closures, application of hand charges for back slopes, firing of a mobile avalauncher for low targets, and a 105 recoilless rifle for high targets. The future plans include the updating of the avalanche atlas and the establishment of a telemetry station for wind, precipitation, and humidity on Parkers Ridge.

At the Marmot Basin Ski Area near Jasper four park wardens assisted by two professional ski patrollers are in charge of avalanche hazard forecasting and control using permanent closures, foot packing, ski stabilization, hand charges, two fixed and one mobile avalaunchers, and one fixed 105 recoilless rifle. The main study plot is at 1891 m elevation and additional regular snow readings are taken at 1100 m and 1654 m. Reading time is 8 a.m. daily and the mountain weather forecast is received twice daily from Edmonton. The future plans depend on area development but, for now, the existing system will be maintained and upgraded.

The Maligne Road in Jasper National Park is subjected to 26 avalanche paths over a distance of 24 km. The road being designated with a low priority is closed when an avalanche hazard arises. One park warden on a part-time basis evaluates the situation. Daily snow and weather readings are taken at Maligne Lake (1673 m) and snow readings are taken at Medicine Lake (1400 m), Bald Hills Road (1800 m), and on the Bald Hills (2100 m).

These are the Snow Wars of Parks Canada. Beside conducting them, the parks staff is also heavily involved in public awareness programs and rescue, but that is a story for another day.

Willi Pfisterer
Alpine Specialist

PUBLICATIONS

Fitzharris, B. B. Frequency and Climatology of Major Avalanches at Rogers Pass, 1909 to 1977. National Research Council of Canada, Division of Building Research Paper No. 956; Publication NRCC 19020. January 1981, 84 p., 28 figures.

A seventy-year record has been compiled of the number and mass of avalanches and the length of railway covered by avalanches at the Canadian Pacific Railway at Rogers Pass, British Columbia. The data showed only weak periodicities of avalanche activity. Several frequency distributions were analyzed for fit of the data, and the Gumbel method found appropriate for short return periods, but the sample period was too short to make conclusions with respect to probable maximum events. The weather before and during intense periods of avalanche activity was investigated and two different circulation patterns responsible for frequent avalanches were defined.

Copies of the publication may be obtained by mailing $4.50 (money order or cheque, made payable to the Receiver General of Canada, credit N.R.C.) to Publications Sales, National Research Council, OTTAWA, Ontario, K1A 0R6.

Gray, D. M., Male, D. H. ed. Handbook of Snow: Principles, Processes and Applications. Pergamon of Canada Ltd., Willowdale, Ontario, 1981.

The book contains information concerning snow and snow problems of interest to those practicing in applied sciences, for example, engineering, agriculture, geography, and meteorology. The individual chapters have been written by scientists and engineers working on snow problems in Canada and the United States.

The material has been organized into four parts. In Part I, on the environment, the material stresses the impact and interaction of snow with living things, climate, and agriculture. In Part II, on snowfall and snowcover, a comprehensive review of the phenomenological aspects of snow during its formation, drifting, and ablation is given, as well as a compilation of physics and physical properties. This Part, although probably of most interest to academics in the natural sciences, provides the background material on which snow management principles are founded. In addition, Part II presents information on snow measurement and the special cases of avalanches, snow, and ice on lakes. Part III, on engineering, emphasizes practical applications in which design criteria and methods of snow and ice control are presented. In Part IV, the recreational aspects of snow are discussed, in particular, skiing and the mechanics of snow skis.

The scope of the book does not allow detailed discussions of all the aspects of snow that are presented. An effort has been made to compensate in part for this deficiency by including a reasonably complete list of references with each chapter.

Because of a considerable lag between the time when the individual chapters were written and the date of publication the book does not contain all the information that has become available since 1977.

The book contains about 800 pages. It will be on sale in the autumn of 1981 and may be ordered through local book stores. The estimated price is $65.00 for a hardcover copy and $25.00 for a paperback copy.

Forum Davos: Skiing and Safety III. Proceedings of an international symposium, September 12 - 14, 1979 at Davos, Switzerland. Buckdruckerei Davos AG, Davos, Switzerland, 1979; 240 p.

The publication contains the papers, discussions, and conclusions of a conference concerned with avalanche safety in skiing.

The book is divided into two parts: 1) preventive and rescue measures; 2) medical aspects. The first part contains papers that describe avalanche safety measures in ski areas and discuss search methods. In the second part the causes of death of people buried in avalanches and survival methods for recovered victims are discussed. The publication is a valuable summary of the state of the art of avalanche search and rescue.

The papers and discussions were written either in German, English, or French without translations or abstracts in the other languages. Most of the contributions that apply to the practical person are in German.

Symposium on Snow in Motion, August 12 - 17, 1979 at Fort Collins, Colorado. Journal of Glaciology, Volume 26, No. 94, 1980, 527 p., published by the International Glaciological Society, Lensfield Road, Cambridge, CB2 1ER, England.

The proceedings of the Symposium were published as a volume of the Journal of Glaciology. The topics of the 51 papers contained in the publication cover avalanche hazard forecasting; modelling of the motion of avalanches with calculation of runout distances; zoning techniques and policies; descriptions of avalanche activity in Iceland, China, Scotland, U.S.A., and Canada; education; fracture mechanics of snow; snow metamorphism; studies of snow drifting; and snow drift control.

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