AVALANCHE NEWS NO. 27

JUNE 1988

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.

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AVALANCHE NEWS
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SNOW AND AVALANCHES
WINTER 1987-1988, WESTERN CANADA

by Peter Schaerer
National Research Council of Canada

The total snowfall for the 1987-1988 winter was about normal on the Pacific Coast and below normal in the Columbia and Rocky Mountains. The temperatures were on the average 2°C above normal with high mean temperatures recorded for every month of the winter. The moderate snowfalls combined with warm weather produced stable snow packs for a large part of the winter and a below normal number of avalanches.

Snow began to cover the mountain slopes in mid-November, which was later than usual, and the snowfalls remained light through November and December. As a result of a persistent high pressure ridge that deflected the south-westerly airflow to the north, the January snowfalls were heavy in northern British Columbia, average on the south coast and below average in the interior. In the Columbia and Rocky Mountains the shallow snowpack remained relatively weak and avalanches starting in new snow often broke to the ground surface. Large avalanches generally were observed only on slopes that were loaded with drifting snow.

The most intense activity with large avalanches occurred between February 9 and 16 when a broad band of moist air from the south-west moved across British Columbia. A first wave produced extensive snowfalls and avalanches in the central and northern part, and a second wave in the south. The largest snow deposition was observed in the Revelstoke area.

The unusually warm weather stabilized the snow rapidly on most slopes in February and March. However, variations of the temperature with exposure and elevation, and strong wind, produced changeable snowpacks. Numerous skiers were caught on slopes with erratic snow conditions.

Heavy precipitation during the last week of March and through April brought the snowpacks to normal depths at the high elevations. As a result of the high freezing levels, however, rain fell and the snowpacks depleted rapidly at elevations below 1200 m on the coast and northern British Columbia and below 1600 m in the interior. The spring avalanche activity was rather moderate.

AVALANCHE INVOLVEMENTS IN CANADA
WINTER 1987-1988

by Paul Anhorn
National Research Council of Canada

The avalanche centre of the National Research Council received reports of 34 incidents when persons or equipment were involved in avalanches. The reporting period covers October 1, 1987 to May 31, 1988. Experience suggests that the actual number of people caught in avalanches is much higher; however, our statistics should cover all incidents with serious consequences.

Number of Incidents

- 20 incidents involved skiers in the back country;
- 9 incidents involved skiers in or close to a ski area;
- 3 incidents involved snowmobilers;
- 1 incident involved sliding on a hill;
- 1 incident involved a vehicle on a highway.

Of these incidents 16 occurred in the Rocky Mountains; 14 in the Interior Ranges of British Columbia; and 3 in the Coast Mountains and Vancouver Island. One fatal avalanche accident was reported from Quebec.

Persons Involved

- 22 persons were caught but remained un-injured on surface;
- 3 persons were caught, remained on surface and were injured;
- 19 persons were partially buried and not injured;
- 3 persons were completely buried and found alive;
- 6 persons were completely buried and found dead;
- 1 person was partially buried and found dead.

Fatal Accidents

1. On January 17, 1988, a party of 20 persons were skiing, with a helicopter, 15 km southeast of Revelstoke, B.C. They were organized into two groups, each led by a guide. A third guide was acting as a tail end guide, bringing down two skiers who had separated from the main group. These three skiers entered an open steep glade in the forest and proceeded to catch up with the rest of the party. The guide skied over a series of convex rolls when an avalanche released. Two skiers were caught in the fringes of the avalanche and managed to ski to the sides while the guide was carried down into open forest. He hit a tree before coming to rest buried beneath 60 cm of snow. His body was found with the help of a transceiver within seven minutes. He had died of massive chest injuries.

2. On February 7, 1988, a group of Nordic cross country skiers toured to Crowsnest Pass in Banff National Park. Two skiers decided to ski down ahead of the group. The lead person had just skied past a narrow V-shaped gulley when he heard his partner yell. Looking back he could only see an avalanche. He climbed back and poked on the surface of the deposit, but could not locate his friend as neither was wearing a rescue transceiver. The survivor climbed back towards the Pass for assistance from the rest of the group. The search started about half an hour after the avalanche released, and the victim was found by probing after 15 minutes. He had died of suffocation, buried under one metre of avalanche snow.

3. A Canadian Press News Release stated that a 13-year-old Girl Guide was killed in an avalanche on February 13, 1988, in Shawinigan, Quebec. Another girl was buried for about two hours under the snow and suffered only minor injuries. A solid slab about 20 m long and several metres wide came loose from the side of a sand hill that the two friends had tried to climb. The pair, who were among 75 Girl Guides, set out to slide down fresh snow covering the hill. A group leader had warned them that it was dangerous and on private property. The two girls were half way up the hill when the avalanche occurred. The leaders called local residents for help in the search. The girls, who were buried under 1.8 m of snow, were located by a searcher using a pole.

4. At 11:00 p.m., February 20, 1988, the Banff Warden Service was alerted regarding two overdue skiers. By 1:00 a.m. the skiers' vehicle was located at the Fish Creek Parking Lot, indicating that the missing persons could have been touring in the Lake Louise Ski Area. After interviewing guests and staff at Skoki Lodge, a popular lodge in the Lake Louise back country, the Park Wardens established that two people fitting the description of the members of the missing party were seen shortly before an avalanche occurred on Fossil Mountain. The search party in the helicopter sighted the first victim on avalanche debris one hour later. At 11:00 a.m. two dog teams started a search. Within 45 minutes an avalanche dog found the second casualty, buried under 1.5 m of snow. Both victims had died of suffocation. Evidence indicated that they were attempting to climb Fossil Mountain on foot when a large avalanche swept them 800 vertical metres to the valley floor. Their skis were cached on the lower shoulder of the mountain.

5. On March 22, 1988, three clients and a guide rented a small helicopter to ski north of Revelstoke, B.C. The group spent the morning skiing five runs of variable aspects and inclines. On the sixth run they chose a steep north facing bowl. The group was instructed to ski one at a time, the guide going first. As he skied over a convex roll, the snowpack failed, carrying him 30 m down. He was completely buried. Immediately one of the clients skied down, located the guide by transceiver, then called the other skiers for help. One skier was half way down, the other still high on the slope when a second, larger avalanche released engulfing

all three. One of them was completely buried, the others partially buried, chest and waist deep. Fifteen minutes after dropping off the party, the helicopter pilot attempted to contact the guide. When he did not get a reply he flew up the ski run and observed the avalanche deposit with only two people visible on it, and realized that an avalanche accident had occurred. He was able to contact a guide 13 km northeast of the accident site, then pick him up with rescue equipment. Meanwhile one of the partially buried individuals had freed himself. He located a buried victim by transceiver and began digging. This was difficult since he had no shovel. The other partially buried skier was stuck in the snow and could not help. The helicopter returned 45 minutes after the first avalanche occurred. Ten minutes later the buried guide was uncovered, alive and hypothermic. He had been under 1.2 m of snow. The second buried victim was freed 20 minutes later from a depth of 2.0 m. A doctor pronounced her dead on the scene.

6. On April 3, 1988, three young skiers chose a run just outside the Whitetooth Ski Area boundary west of Golden, B.C. for their last run of the day. Two of them, 19 and 14-year-old cousins, had skied the same run earlier in the morning. They released a small avalanche at that time. To ski their route they had to ski past two signs, one saying "Closed" and the other "Ski Area Boundary". In addition, there was a large sign warning skiers of avalanche hazard outside the ski area on the top of the chairlift. After skiing through sparsely treed forest, they reached a 40 degree open slope. Warm weather had made the snow extremely unstable. An avalanche started slightly below the third skier, moving the middle boy a few metres before he could hang onto a tree. The heavy mass carried the victim over a cliff before burying him in dense trees. The boys searched for 10 minutes, then went for help. An avalanche dog found the victim under 1.2 m of wet avalanche snow. He had died of internal injuries.

TECHNICAL SESSION OF THE CANADIAN AVALANCHE ASSOCIATION

by John Tweedy
Secretary-Treasurer
Canadian Avalanche Association

The Canadian Avalanche Association held its annual technical, social, and business meeting on May 4 and 5, 1988 at Kelowna, British Columbia. Following is a summary of the discussions at the technical sessions.

Site Selection of Test Snow Profiles by Chris Stethem
(Chris Stethem and Associates)

The selection of the site is critical for making conclusions about the snow stability. The considerations for site selection, the limits of applicability and the objectives of test profiles need to be emphasized and taught to a greater extent in courses. It was suggested that the field book, notes and records of profile observations contain comments about the reasons for taking the profile at the particular site.

Shovel Shear Test Evaluation by Peter Schaerer
(National Research Council, Canada)

The shovel shear test was studied by making a stress analysis and field observations of its variability. It was concluded that:

- it is an acceptable test for determining the location of weak layers in a snowpack, but it is a poor test for observation of the snow strength;
- the size and form of the snow crystals in the shear plane must be determined with each test;
- the test column should not be longer than 70cm and its cross section area not greater than 0.1 m^2; best is a width 0.25m and a depth 0.4m^2;
- at least two tests per site are required, and even then one should not be too confident about the results.

Rescue Practice in Various Operations

Brian Leighton (Whistler Ski Corporation, Whistler, British Columbia), Scott Flavelle (Helicopter Ski Guide, Squamish, British Columbia), and John Tweedy (British Columbia Ministry of Transportation and Highways, Kootenay Pass, British Columbia) gave presentations on staff training for search and rescue.

- all three discussions emphasized early winter training with all staff who may become involved in a rescue; i.e. lift operators, lodge personnel, equipment operators, administration staff.
- early season training within a highways operation usually starts with the basics (rescue transceivers, probing, etc.) and progresses to mock rescue scenarios run during the day and night.
- helicopter skiing operations carry rescue equipment on board the helicopter and in the guide's packs, and have additional equipment at the base of operations.
- with all training sessions or mock rescue exercises, a good positive critique session is suggested.

- use of the R.C.M.P. dogmasters and dogs was recommended during rescue exercises.

- snow stability evaluation was mentioned as an item that should be stressed during these training sessions.

Avalanche Research at the National Research Council of Canada
by Peter Schaerer

Current projects of study were presented:
a) Snow glide analysis - Coquihalla Pass
b) Runout studies of natural avalanches
c) Temperature vs. shear strength studies
d) Shovel shear test evaluation

Computer Systems and Avalanche Hazard Forecasting
by Bill Moffat (British Columbia Ministry of Transportation and Highways, Victoria, B.C.)

A general overview of the British Columbia Ministry of Transportation and Highways computer system in the Snow Avalanche Section was presented.

- an effort is currently in progress to decentralize the system from the mainframe concept to a micro-computer based system. Older equipment in key places has delayed implementation of this developmental concept but it is proceeding.
- in-depth training is provided for the field technicians.
- data entry programs for weather, snowpack and avalanche occurrences were designed 'in-house'. Commercial software for data analysis is now in the testing phase.

Avalanche Accidents and Incidents

Paul Anhorn (National Research Council of Canada, Revelstoke) presented the statistics of avalanche incidents for the 1987-1988 winter. Paul Anhorn, Bruce Allen (British Columbia Ministry of Transportation and Highways, Revelstoke), and Dave Norcross (Parks Canada, Lake Louise) discussed the case histories of the accidents that resulted in fatalities. Details are given under a separate heading in this issue of Avalanche News.

Coquihalla Avalanche Control Ropeways
by Randy Stevens (British Columbia Ministry of Transportation and Highways, Victoria, B.C.)

- a slide presentation was given on the construction, testing and operational use of the ropeways.

De-icing System for Remote Weather Instruments
by Mike Zylicz (British Columbia Ministry of Transportation and Highways, Terrace, B.C.)

- a brief description of an improved de-icing system was presented. Field testing indicates that with this system wind speed instruments will not rime quickly in large storms. Field work was carried out in the Skeena Mountains.

Canadian Avalanche Rescue Dog Association
by Rod Pendlebury (C.A.R.D.A.)

- Rod Pendlebury presented a promotional video of C.A.R.D.A. Unfortunately, the technical session had adjourned and only ten to twelve individuals saw the video. An apology to C.A.R.D.A. from the meeting organizer.

Avalanches from Man-made Snow
by C. Stethem (C. Stethem and Associates)

Mt. Allen experienced two incidents this past season with people and snow grooming equipment being caught in avalanches that released in man-made snow. It appears the early season natural snow cover was affected by a strong temperature gradient that allowed advanced facetting to take place. Man-made snow was laid over top of this during subsequent snowmaking sessions. After the avalanches occurred, boot packing and other roughening up procedures were used on these steep runs to mix the natural and man-made snow together.

Tensile Strength Tests
by Bruce Jamieson (University of Calgary)

The method, equipment and results of observations of the tensile strength of snow slabs at the Lake Louise Ski Area were described. The strength was determined in brittle failure by pulling rapidly a block of snow with a pre-cut notch. The observed strengths were lower than tensile strengths observed in laboratories and reported in the literature.

BUSINESS OF THE CANADIAN AVALANCHE ASSOCIATION

The Canadian Avalanche Association held its annual meeting at Kelowna on May 5, 1988. The Association currently has 83 active and 20 associate members.

The Directors elected at the meeting are as follows:

Chris Stethem	President
Walter Schleiss	Vice President
John Tweedy	Secretary-Treasurer
Scott Flavelle	Chairman, Membership Committee
Tim Auger	Director at Large
Roger McCarthy	Director at Large
David Chadder	Representative of Associate Members

A Committee was elected with the task of producing training aids. An instructional video on snow profile observation is under production, and a video on application of explosives for avalanche control is being considered. It was decided to make the videos "in-house", similar to the terrain video, rather than to produce a high-quality, professional but expensive show.

The members of the Training Aid Committee are John Tweedy, Clair Israelson, Bruce Allen, Art Twomey and Karl Klassen.

GUIDELINES FOR WEATHER, SNOWPACK AND AVALANCHE OBSERVATIONS

reported by Peter Schaerer

On May 5, 1988 the members of the Canadian Avalanche Association discussed the proposed revisions of the Guidelines for Weather, Snowpack, and Avalanche Observations, (Technical Memorandum No. 132, National Research Council, Canada). The proposed revisions were published earlier in Avalanche News No. 26 (February 1988).

The Directors and the members of the Association expressed concerns about the legal implications of recommending minimum standards and making mandatory selected observations. The revisions were returned to the Committee which prepared them. In a vote the majority of the Association members directed the Committee to prepare a new version that would be a reference text as opposed to a code of practice and standards.

The Committee members Walter Schleiss, Janice Johnson, Roger McCarthy, Herbert Bleuer, and Peter Schaerer were re-elected. After consulting with a lawyer who specializes in litigation, the Committee will re-draft the Guidelines before the coming winter. The new draft will be presented to the members of the Canadian Avalanche Association for comments and may be accepted at the annual general meeting in May 1989.

At this time the Committee invites additional comments and recommendations from the users of the Guidelines.

The intention of the revision is not to change the description of observations, techniques, terminology, and recording methods, except for clarification of existing statements.

AVALANCHE COURSES

by Peter Schaerer

NRC/CAA/BCIT Courses

Avalanche courses organized jointly by the National Research Council of Canada, the Canadian Avalanche Association, and the British Columbia Institute of Technology were again held during the winter of 1987-1988 as follows:

Date	Location	Type	Number of Participants	
			Registered	Passed
Dec. 14-18/87	Creston	Transportation & Industry-Level 1	23	23
Nov. 28-Dec.4/87	Whistler	Ski Operations-Level 1	23	23
Dec. 6-12/87	Whistler	Ski Operations-Level 1	15	14
Jan. 10-17/88	Assiniboine Lodge	Ski Operations-Level 1	18	18
Jan. 16-23/88	Boulder Hut	Ski Operations-Level 1	10	10
Jan. 17-24/88	Assiniboine Lodge	Ski Operations-Level 1	19	18
Jan. 25-31/88	Lake Louise	Ski Operations Level 1	21	17
Jan. 4-11/88	Whistler	Ski Operations Level 2	20	20
Total of 8 courses			149	143

It is intended to hold the courses again in 1988-1989 with the same curriculums and instructional standards as in previous years. Some course locations may change. At this time it is not known whether or not the current levels of course fees can be maintained.

Awareness Courses

The Canadian Avalanche Association decided at the meeting of May 5, 1988 to publish a list of active members who wish to teach avalanche courses. The list will be published in Avalanche News No. 28, October 1988. The courses concerned are mainly awareness courses for the general public.

Active members of the Canadian Avalanche Association who intend to teach avalanche courses in the coming winter are invited to submit to the editor of Avalanche News their names, addresses, and telephone numbers together with the type of course which they are interested in teaching. By submitting their names, members must be prepared to teach courses in the winter of 1988-1989.

WEATHER SEMINAR

The Canadian Avalanche Association and the Atmospheric Environment Service are conducting a weather seminar from 0900 hours to 1600 hours on October 11, 1988, in the Parkhurst Room, at the Whistler Convention Centre. This is the day before the ISSW begins (see following items).

Speakers tentatively scheduled include Rich Marriott of the Northwest Avalanche Centre, Seattle, Washington; Pam Hayes; Kel Fenwick of Whistler Mountain, Whistler, B.C.; Vello Puss of the Pacific Weather Centre, Vancouver, B.C.; a representative from the Vancouver Airport Weather Office, Vancouver, B.C. and possibly some others.

Pre-registration is required at a cost of $15.00 per person to the following address:

ISSW Committee
Box 74
Whistler, B.C.
V0N 1B0

Please complete and forward the form on the next page as soon as possible.

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WEATHER SEMINAR REGISTRATION
October 11, 1988 @ 0900 - 1600 hours
Parkhurst Room, Whistler Convention Centre

Name_____

Address_____

_____

_____

I have enclosed $15.00 per person to pre-register for this seminar.

_____ X $15.00 =_____

Total Enclosed . _____

Signature_____

Do not send cash; personal cheques or money orders only.

Payable to: ISSW Committee
Box 74
Whistler, B.C.
V0N 1B0

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INTERNATIONAL SNOW SCIENCE WORKSHOP

The registrations are arriving for the International Snow Science Workshop, October 12-15, 1988, at Whistler, British Columbia. Early registration is recommended as the total attendance is limited to 300 persons. The papers that have been proposed promise a varied and interesting program.

The hotels at Whistler offer attractive rates; in addition hostels and campgrounds are available.

Contact Address:

ISSW '88 Committee
P. O. Box 67
Whistler, B.C., Canada
VON 1B0

Registration fee - $80.00 Canadian; $65.00 U.S.

PUBLICATIONS

Avalanche Formation, Movement and Effects

Edited by Bruno Salm and Hansueli Gubler, Proceedings of the Symposium at Davos, Switzerland, September 14-19, 1986. IAHS Publication No. 162, 1987; price $50.00 U.S. Published by the International Association of Hydrological Sciences. Orders may be sent to:

Office of the Treasurer IAHS
2000 Florida Avenue N.W.
Washington, D.C. 20009
U.S.A.

Attention: Meredith Compton

The publication contains 61 papers presented at the symposium. They deal with snow as a material, properties of the snow pack, weather relating to avalanches, snow melts, modelling of avalanche movements, snow slab failure, avalanche hazard forecasting, and avalanche risk analysis.

David R. Butler

Snow-avalanche hazards, Southern Glacier National Park, Montana: The nature of local knowledge and individual responses. Disasters, The International Journal of Disaster Studies and Practice, London, U.K. Vol. 11, No. 3, p. 214-220; 1987.

A survey was conducted of well-educated residents of East Glacier Park, Montana, who are frequently isolated by snow avalanches. It showed that people in this area do not alter driving habits during times of avalanche danger, are not aware of the local avalanche warning system, and have not efficiently garnered information about the avalanche hazard.

David R. Butler

Snow-avalanche hazards in Glacier National Park, Montana: Meteorologic and climatologic aspects. Physical Geography, Vol. 7, No. 1, p. 72-87; 1986.

The weather patterns, types of avalanches, triggers, and snowpack conditions of historical avalanche events were analyzed.