AVALANCHE NEWS NO. 30

JUNE 1989

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.

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AVALANCHE NEWS
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SNOW AND AVALANCHES
WINTER 1988-1989 - WESTERN CANADA

by Peter Schaerer
National Research Council of Canada

Following is a general picture of the winter. Individual valleys have deviated from this description, as in some areas the snowfall and avalanche activity varied strongly over short distances.

The total snowfall was about average on the South Coast and in the Rocky Mountains, but below normal in the Southern Interior. Northern British Columbia and the Yukon received near normal total amounts of snow, but most of it fell before February 1. In general, the avalanche activity was moderate. Few deep instabilities were noted in the snowpacks; consequently most avalanches contained new snow. Some of them, however, were spectacular in size owing to heavy snowfall in combination with high temperatures.

The October to December precipitation was normal in the south, but was associated with high temperatures. As a result, rain fell frequently and the snowpacks remained thin but well consolidated. The north received above average snowfall in the first part of the winter; this resulted in numerous avalanches.

A seemingly endless series of frontal systems moved from the Pacific across British Columbia after Christmas. They brought the snowpacks to normal in the south and to record highs in the north. The storms on January 16 and 17, and from January 26 to 29 caused widespread avalanche activity, as they were associated with high temperatures. The avalanches during the second storm blocked numerous highways and railways in northern British Columbia.

February was unusually cold and dry, with average temperatures 3° C to 7° C below normal.

The sharp change of temperature from high to very low at the end of January produced stable snowpacks. Strong northerly winds, caused by unusually high air pressure in the Arctic, redistributed the snow at the high elevations. This resulted in erratic snowpacks, though at many places the wind had the beneficial effect of removing unstable snow at the surface. The regular annual mid-February storm arrived on February 17 but it was too weak to cause significant avalanches.

March was cold and wet with snowfalls heavy on the coast and moderate in the interior. At the beginning of the month, the new snow slid readily on the snow surfaces which had weakened under the cold February weather. Later, the bonding in the snowpacks strengthened rapidly. The avalanches generally were small. With unstable weather, moderate snowfalls, and high temperatures, the winter faded away in April. Large spring avalanches were rare.

AVALANCHE INVOLVEMENTS IN CANADA
WINTER 1988-1989

by Paul Anhorn
National Research Council of Canada
Revelstoke, B.C.

The Avalanche Centre of the National Research Council received reports of 45 incidents where persons or equipment were involved in avalanches. The reporting period covers October 1, 1988, to April 30, 1989. Probably more persons than reported were caught and partially buried in avalanches. However, our statistics probably contain all incidents with serious consequences.

We wish to thank all the people who sent in avalanche involvement reports. Their cooperation is much appreciated, and it is hoped that the information gathered will assist readers in drawing attention to avalanche hazard. The file remains open, and additional reports of avalanche encounters of this past winter and during the summer will gladly be received.

Number of Incidents

- 16 incidents involved skiers adjacent to a ski area
- 7 incidents involved skiers in a ski area
- 13 incidents involved skiers in the back-country
- 3 incidents involved moving vehicles on a highway
- 2 incidents involved damage to a power line
- 1 incident involved a person in a home
- 1 incident involved ice climbers
- 1 incident involved a snowmobiler in the back-country
- 1 incident involved damage to a dock and barge

Most incidents with skiers in ski areas involved patrolmen on their control routes. While they are conducting the avalanche control, the runs in question are closed to the public.

Mountain Ranges

- 18 incidents in the Coast Range
- 16 incidents in the Rocky Mountains
- 9 incidents in the Interior Ranges of British Columbia
- 2 incidents on Vancouver Island

Persons Involved

- 15 persons were caught but remained on surface uninjured
- 24 persons were partially buried and not injured
- 4 persons were partially buried and injured
- 3 persons were completely buried and found alive
- 5 persons were completely buried and found dead
- 1 person was found on the surface but died later as a result of injuries

Of the persons who were completely buried and survived:

- 2 were found by transceivers within 15 minutes.
- 1 was dug out unconscious and blue by his companions. He was buried for 30 minutes under 1 metre of snow. An object on the surface helped to find him.

Of the persons who were recovered dead:

- 2 were found by organized rescuers using probes
- 2 were found by transceivers
- 1 was found by a trained avalanche dog

Vehicles

An avalanche dusted a road, blinding 2 logging truck drivers who had a head-on collision.

Fatal Accidents

On December 28, 1988, two ice climbers were ascending a frozen waterfall on Mount Stephen in Yoho National Park. They were climbing unroped when an avalanche hit them from above. The upper climber was carried off and completely buried, while his partner ended up injured and partially buried in the centre of the deposit. It took him 45 minutes to free himself from the snow, then he crawled for 2.5 hours to the railroad tracks below. A train picked him up a short time later. The alerted rescue personnel from the Canadian Park Service probed for many hours in the snow/ice mixture of the deposit. Finally, within minutes of its arrival, a trained avalanche dog located the victim.

On January 2, 1989, three skiers decided to descend a steep slope just outside the Blackcomb Mountain Ski Area. Two individuals ski-cut across the top of a chute, remaining there to watch the third man ski under a cliff band. He was out of sight when the avalanche released. Realising that an avalanche had occurred, the two survivors skied down to the deposit and began a transceiver search. Digging for about 20 minutes, they exposed the victim's head but had insufficient room to administer artificial respiration. A fourth skier who had witnessed the avalanche notified the Blackcomb Ski Patrol. Half an hour after the accident, rescuers were on the scene with defibrillator, monitor, and doctor's pack, but the victim could not be revived.

On January 4, 1989, a party of 14 snowmobilers drove to Middle Kootenai Pass approximately 8 km south of the Westcastle Ski Area in southern Alberta. A large avalanche hit them from above, burying one person completely and partially burying two snowmobilers with their machines. One witness went to the ski area for help, while the other ten survivors started a search using broken tree branches as probes. Ski patrollers immediately proceeded to the accident site with the necessary rescue equipment. Ater two hours of probing, a probe line found a buried snowmobile under 30 centimetres of snow. The victim was then located 10 metres above the excavated machine. A doctor on

the scene started C.P.R. The resuscitation efforts continued during the helicopter flight to the hospital but the victim was pronounced dead on arrival. Due to poor weather, avalanche dogs could not be flown to the scene earlier; a helicopter with a handler and his dog arrived just after the rescuers had freed the victim.

At 2 p.m., on January 28, 1989, two back-to-back avalanches swept through Telegraph Creek, a northern community in B.C. The avalanches hit four houses, demolishing three. One house was occupied by an 80-year-old woman who had refused to leave the house when she was warned of the danger. Her house was completely demolished and went over the bank 30 metres down to the Stikine River. The woman was found alive on the surface. She was carried to a neighbouring house where she died of her injuries shortly after. The other three damaged houses were unoccupied; two were carried off their foundations, and the third one was buried in avalanche snow.

On March 15, 1989, four out-of-bound skiers video-taped themselves skiing the untouched powder snow outside Whistler Mountain Ski Area. On the third run on the same slope, two skiers jumped the top cornice simultaneously. Their impact on the snow released an avalanche which hit the cameraman below. He was standing at the side of a small moraine, and the avalanche buried him as he was trying to escape. The two skiers above were partially buried. Other skiers in the area assisted them, then they started to search for the missing victim. He was found by probing under four metres of avalanche debris.

On March 15, 1989, four groups of helicopter skiers skied all morning on a large slope above the timberline in the Monashee Range south of Mica Creek, B.C. After the slope was completely tracked up, the groups decided to leave the area. The last group to do so traversed the slope at the top with the skiers well separated. Four skiers were skiing safely across the slope when an avalanche released from above. Three members of the party were carried down, two were completely buried, the other one partially engulfed. The guide instructed all survivors to turn their transceivers on receive, then skied down to the main deposit where he picked up a signal. Ten minutes after the avalanche had occurred the first victim was uncovered. He was blue in the face, not breathing and unconscious. Two quick airblows by a rescuer brought him back to spontaneous breathing. In the meantime, the guide had located the other person. He had been in the snow for twenty minutes, but had died of asphyxiation.

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TECHNICAL SESSION OF THE CANADIAN AVALANCHE ASSOCIATION

by Peter Schaerer

The Canadian Avalanche Association held its annual technical, social, and business meetings on May 3 and 4, 1989, at the Vernon Lodge, Vernon, British Columbia. Approximately 70 active members and representatives of associate members attended. Following is a summary of the topics that were discussed at the technical sessions.

Avalanche Research in Progress at The National Research Council of Canada

by David McClung

A. Maximum Runout Distances and Dynamics of Avalanches. The runout distance, ΔX of large avalanches is measured from the point where the incline of the slope in the avalanche path decreases to 10 degrees. The runout ratio, which is ΔX divided by the horizontal distance from the top of the starting zone to the 10-degree slope incline, was determined for about 500 avalanche paths in the Rocky Mountains of Canada, the Colorado Rocky Mountains, the Sierra Nevada, coastal Alaska, and western Norway. Extreme-value probability distributions fitted to the observed runout ratios proved to vary among the mountain areas. Runout distance data from a minimum of 30 avalanche paths per mountain area are required for the calibration of predictive equations of the runout ratio for design purposes.

The distribution for avalanche speeds along the incline was described using a model featuring dense granular flow. It is estimated that 90 percent of the drag is at the boundary between the flowing snow and the sliding surface (granular drag), and that the remaining 10 percent is due to air drag. Speed data imply that avalanches have relatively low friction at the start of motion, with high friction and rapid deceleration in the runout zone.

B. Snow Glide Observations. For two winters, measurements have been made of the speed of snow gliding on a wet rocky slope at the Coquihalla Summit. The movement of the snow along the ground was determined with glide shoes and recorded hourly with the co-operation of the Avalanche Technicians of the Ministry of Transportation and Highways of British Columbia.

Gliding snow often has resulted in unpredictable avalanches, seemingly unrelated to weather conditions. The observations to date have shown that the gliding phenomenon is very complex, but the following conclusions can be made:

- The distance of gliding depends on the snow depth and the air temperature (with a time lag).
- The daily average glide speed varies strongly.
- A greater rate of gliding was observed below a glide crack than above it.

C. Effect of Temperature on Shear Failure of Alpine Snow. Slow shear tests have shown that temperature has profound effects on the shear failure characteristics of alpine snow. The number of acoustic emissions during shearing increases by a factor of 10 as the temperature decreases from -2° C to -15° C, and the initial sample stiffness increases markedly with temperature decrease.

D. Avalanche Handbook. The writing of a new book has begun as a replacement of the outdated Avalanche Handbook of the U.S. Forest Service. Dave McClung presented a proposed outline of the content of the book.

Avalanche Accidents

Paul Anhorn presented a summary of the avalanche incidents in Canada during the winter 1988-1989. Wayne Flann, Jack Bennetto, Clair Israelson, Brian Leighton, Kel Fenwick, and Bryan Keefer described those avalanche accidents with fatalities. The incidents and accidents are discussed under a separate heading in this issue of Avalanche News. Tony Moore and Nic Seaton described the large avalanches that occurred January 26-29, 1989, at Bear Pass and Ningunsaw Pass, in northern British Columbia.

Avalanche Search and Rescue

Chris Stethem reported, in response to a magazine article, that the Canadian Avalanche Association does not recommend the RECCO System as an avalanche rescue tool in the back-country. The reason is that in most cases the search unit would be on the accident spot too late for a live rescue. Several ski areas in Western Canada have purchased the search unit.

Avalanche Warning Service

For the past two winters, the Alberta Avalanche Safety Association has provided a public back-country avalanche hazard forecast. The Rocky Mountain national and provincial parks supplied the forecasts, and the Alberta Avalanche Safety Association recorded them on tape. The public was able to obtain the taped messages either through a local telephone number in Edmonton or a toll-free long-distance call. This service, which was much appreciated by the Canadian Avalanche Association, was a great success.

The members of the Canadian Avalanche Association agreed that a similar service should be initiated for the coast and the interior of British Columbia. The local ski areas would supply their back-country hazard forecast to a centre. The possibility of implementing such a service will be investigated.

Gas-Powered Gun

by Garry Walton

A larger version of the avalauncher has been designed and is ready on paper, but is waiting the financing of a prototype. The gun operates with compressed air supplied by a compressor to the tanks, with pressures between 1300 and 3000 psi. The maximum range on level terrain is 7000 metres. Three different types of projectiles with super-quick and delay mortar fuse have been designed. The estimated cost of the gun without air supply is $10,000.

Gas Exploder

by Karl Ernst, Mueller Lifts

A gas exploder for avalanche control with the trade name of GAZ.EX was developed in France. It has been tested for two years and is now being produced. It has been applied in France and Switzerland.

The equipment consists of a shelter with oxygen and propane tanks at a safe location, a cannon in the avalanche starting zone, gas supply lines, control valves, and an ignition system in the cannon. A mixture of oxygen and propane produces the explosion, which is directed toward the snow surface. The exploder can be fired from a remote location quickly and safely and requires little maintenance during the winter.

The approximate cost per avalanche path decreases when several paths can be treated from the same shelter. The low cost of the gases mitigate the high equipment cost.

HIGHLIGHTS OF THE ANNUAL GENERAL MEETING OF THE CANADIAN AVALANCHE ASSOCIATION

Held at Vernon, B.C. on May 4, 1989

The following individuals were elected as Directors:

President:	Chris Stethem
Vicepresident:	Walter Schleiss
Secretary/Treasurer:	John Tweedy
Chairman, Membership/Committee:	Scott Flavelle
Director-at-Large:	Roger McCarthy
Director-at-Large:	Tim Auger
Associate Members Representative:	Nikko Weis

Highlights

1. The Association will assume complete direction and operation of the professional-level courses at the Avalanche Schools.

2. The ISSW '88 report commented on an excellent workshop which took place at Whistler, B.C., in October 1988. Papers will be published soon.

3. Revised guidelines on weather, snowpack, and avalanche observations were adopted. NRCC will print the new guidelines.

4. The Association viewed the video A Question of Balance, produced in the U.S. After technical concerns were noted, the Association membership voted to endorse the video as a good introduction to avalanche phenomena.

5. The Training Video Committee will produce two videos this summer: Snow Profile Techniques and Avalanche Control With Explosives. All the photography is now completed. Scripting, editing and production will begin in June with the assistance of Art Twomey.

6. Changes to the bylaws in the Constitution were adopted. The highlight here is the fact that now any group of more than three (3) individuals may join the Association as Associate Members with no official affiliation to any agency or company.

7. The position of Past President was established to ensure continuity when the position of President is assumed by a new individual.

8. The Association recognized the Alberta Avalanche Safety Assciation's fine effort with regard to the Avalanche Information telephone system they instituted last winter.

9. The 1989 budget was adapted after revisions to reflect increased costs, now that the Association will be running the Avalanche Schools.

John Tweedy
Secretary/Treasurer

INTERNATIONAL SNOW SCIENCE WORKSHOP 1988

At the Annual General Meeting held on May 4, 1989, the members of the Canadian Avalanche Association carried a motion of thanks to the Organizing Committee of the International Snow Science Workshop, which took place at Whistler, B.C., on October 12-14, 1988.

The Workshop was a success owing to the dedication and personal efforts of the Organizing Committee, under the chairmanship of Chris Stethem and Dave McLung. Dave collected the papers and prepared the program. The Canandian Avalanche Association also expresses its thanks to the Whistler Mountain Ski Corporation for its administrative support.

The Proceedings containing the papers from the Workshop have been printed. Copies have been mailed to all registered participants. Additional copies may be purchased from the Canadian Avalanche Association, 3650 Wesbrook Mall, Vancouver, B.C., V6S 2L2, Tel. (604) 666-6741). Price per copy is $25 Can or $21 US. Please include a cheque or money order with your request.

AVALANCHE RESCUE TRANSCEIVERS

by Peter Fuhrmann, Canadian Parks Service,
Canadian Representative to the International Committee on Alpine Rescue (IKAR)

Recent communication with the Department of Telecommunications, Canada, established that a frequency of 457 kHz can be used for transceivers. Because of the regulations governing frequencies and power output of the instrument, these units do not have to be licensed. This information was provided to Puls Electronics (Pieps) Austria, the largest importer of transceivers into Canada. Puls, therefore, will follow the recommendation of IKAR, to only supply Canada with Dual Frequency instruments, Pieps DF 2.275/457 kHz, for the period of changeover until only 457 kHz instruments will be produced. In all likelihood, the final changeover will occur in 1991.

A paper recently published by Rob Faisaut, IKAR Representative of the USA NASAR, clearly defines the US position and recommends a gradual changeover to 457 kHz. Therefore, US and Canadian opinions are compatible.

My advice to purchasers of avalanche transceivers is to buy only dual frequency instruments (that is Ortovox or Pieps DF) at this time, as recommended by IKAR Subcom. Avalanche. These transceivers will be compatible with the single 457 kHz frequency instruments of the future.

Should you purchase a single freqeuncy 2.275 kHz instrument, you will find that this transceiver will not be compatible with what is going to be on the market by 1991.

ALBERTA AVALANCHE SAFETY ASSOCIATION

Backcountry Avalanche Information

With the co-operation and assistance of the Canadian Parks Service and Alberta Recreation and Parks (Kananaskis), the Alberta Avalanche Safety Association reports on a daily basis the Backcountry avalanche information. The reports are pre-recorded on tape; they are available to the public by telephone in Edmonton and through a toll free number for the remainder of Alberta.

Telephone Calls Made to the Edmonton Number 466-4636

1987/88			1988/89		
			Nov.	24-30	6
			Dec.	1-31	64
			Jan.	1-31	168
Feb.	1-29	59	Feb.	1-28	107
Mar.	1-31	96	Mar.	1-31	103
Apr.	1-30	51	Apr.	1-30	89
May.	1-10	10	May.	1-10	18
	TOTAL	216		TOTAL	555

Telephone Calls Made to the
Alberta Toll Free Number 1-800-772-2434 (in hrs.)

1987/88			1988/89		
			Jan.	1-30	19.0
Feb.	1-29	1.5	Feb.	1-28	11.3
Mar.	1-31	4.8	Mar.	1-31	9.0
Apr.	1-30	2.7	Apr.	1-30	7.3
	TOTAL	9.0 hrs.		TOTAL	46.6 hrs.

PROFESSIONAL AVALANCHE COURSES

by Peter Schaerer

1988 - 1989 Courses

Selkirk College at Nelson B.C., administered the 1988-1989 avalanche courses of the Canadian Avalanche Association and the National Research Council. Selkirk College appointed Tom Van Alstine as the co-ordinator of the courses. The Canadian Avalanche Association appreciates the work and wishes to thank the management of Selkirk College and Tom for their services and their dedication.

The following courses were held:

Date	Location	Type	Number of Participants
Dec. 4-10	Whistler	Ski Operations - Level 1	28
Jan. 7-14	Lake Louise	Ski Operations - Level 2	20
Jan. 16-22	Golden	Ski Operations - Level 1	24
Jan. 28 - Feb. 3	Mt. Engadine Lodge, Kananaskis	Ski Operations - Level 1	24
Feb. 4-11	Boulder Hut, Kimberley	Ski Operations - Level 1	12
Feb. 6-10	Creston	Transportation and Industry Level 1	24
Feb. 11-17	Turbine Canyon, Kananaskis	Ski Operations - Level 1	10
Total Participants for the Seven Courses			142

All the participants met the course requirements and passed the course.

The Avalanche Control Course planned for January 16-20 at Whistler had to be cancelled owing to an insufficient number of registrations. The ski operations courses, however, were full to capacity and could not accept all those interested in attending.

1989 - 1990 Courses

At the meeting held on May 4, 1989, the Canadian Avalanche Association decided to carry the responsibility of administering the future avalanche courses without the participation of a college. The courses, therefore, will be a joint venture of the Canandian Avalanche Association and the National Research Council of Canada. The Avalanche Association will apply for registration as a training institution in the Provinces of British Columbia and Alberta. Tentatively, the following courses are planned:

Avalanche Safety for Transportation and Industry - Level 1

December 4-8 and December 11-15, at Creston, B.C.

Avalanche Safety for Ski Operations - Level 1

December 2-8, at Whistler, B.C.

January 28 - February 3, at Mount Engadine Lodge, Canmore, Alberta.

February 11-17, at Creston, B.C.

Avalanche Safety for Ski Operations - Level 2

December 10-17, at Whistler, B.C.

Refresher for Ski Operations - Level 2

December 19-21, at Creston or Roger Pass, B.C.

The brochure describing the avalanche courses for the 1989-1990 winter and containing information about registration should be available in late September. Persons and organizations who wish to receive the brochure and additional information should write to the Canandian Avalanche Association providing their name and complete address including postal code.

Send requests for the brochure to:

Canadian Avalanche Association
3650 Wesbrook Mall
Vancouver, B.C.
V6S 2L2 Telephone: (604) 666-6741

Avalanche Awareness Courses

As decided at the meeting held on May 5, 1988, the Canadian Avalanche Association publishes the names of active members who organize or are prepared to teach Avalanche Awareness Courses for the general public. A list of courses and interested members will be published again in Avalanche News, No. 31, in October 1989.

Active members who intend to teach Avalanche Awareness Courses in the Winter of 1989-1990 are invited to submit to the editor of Avalanche News, their name, address, telephone number, and the type of courses which they plan or wish to teach. By submitting and publishing their intention, those persons interested will commit themselves to teach courses when requested.

NATIONAL AVALANCHE SCHOOL

by Alicia Leppert
NSP Marketing/PR Director

Lakewood, Colorado . . . . Whether you work or play in snow-covered mountains, the National Avalanche School can help you improve your knowledge of avalanche science. Applications are now available for the Eleventh National Avalanche School, which will be held Sunday, November 5 through Thursday, November 9, 1989, at the Lakewood Sheraton Hotel, Lakewood, Colorado.

Students who attended the last school praised it as the most informative so far, on their evaluations. Building on this solid platform, an even better school is planned for 1989, with workshops geared to different knowledge levels. Tuition for five days of lectures, small group workshops, exhibits, and discussions is $295 US.

Course topics will include mountain meteorology, safe winter travel, control fundamentals, rescue, snowpack characteristics, stability evaluations, avalanche phenomena, and snow pits. Students who successfully complete the classroom sessions will have an option to sign up for field sessions so that they can apply their knowledge outdoors.

To apply for the school, contact Ms. Frankie Barr, NAS Coordinator, National Ski Patrol, Ski Patrol Building, Suite 100, 133 South Van Gordon Street, Lakewood, Colorado 80228, (303) 988-1398.

The National Avalanche School is sponsored by the National Avalanche Foundation, a non-profit organization administered by the National Ski Patrol. The National Avalanche Foundation participates in scientific studies and promotes research into the problems of snow avalanche protection and safety. The National Ski Patrol, the world's largest winter rescue group, provides first aid, rescue and safety services, and promotes skier safety.

MOUNTAIN WEATHER FORECAST

by Peter Schaerer

The Pacific Mountain Weather Committee met on May 18, 1989, at the office of the Atmospheric Environment Service in Vancouver. The Committee includes representatives of the Pacific Weather Center, Weather Services, Ski Operations, and Highways. Its objective is to review and develop the weather forecast and weather services for avalanche safety operations.

The attendees at the meeting generally were satisfied with the Mountain Weather Forecast of this past winter. It was resolved that the format and times of issue should not be changed in the winter of 1989-1990. The confidence statement at the end of each forecast was found particularly valuable. Minor problems were noted with respect to the communications with briefers of the local weather offices. It was recommended again that the avalanche hazard forecasters establish contact with their weather offices before the winter, introduce themselves, state their needs, and arrange mutually optimum times for their daily discussions of the weather.

The Pacific Weather Centre has changed its communication system from land lines to satellite, but the equipment is too expensive for private users to pick up the transmissions. Another change that may take place is a re-assignment of forecaster desks from user-directed forecasts (for example aviation, public) to regional forecasting.

The representatives of the Pacific Weather Centre noted that ski operators and Highways staff provide much useful feedback information about the local weather. The information assists the forecasters to improve the next forecast and to answer inquiries.

The weather forecasters regret that the flow of information stops in the summer. They wish to encourage operators who work year-round to maintain their contact with the Weather Offices during the summer.

The Committee decided to organize one-day visits to the Pacific Weather Centre. These visits are intended for users of the Mountain Weather Forecast. The tentative dates are November 21 and 22. Details on the visits and how to register will be announced in the October issue of Avalanche News.

Users of the Mountain Weather Forecast should note that the Committee has no formal membership. Anybody who uses the Weather Forecast regularly for avalanche hazard forecasting is invited to attend the annual meeting. The next meeting will be held on May 17, 1990.

AVALANCHE RESOURCE AGENCIES

Dean Monterey of the British Columbia Provincial Emergency Program wishes to announce the following changes to the list of Avalanche Resource Agencies published with Avalanche News, No. 29, February 1989.

On Page 9 add the following to "Provincial Emergency Program".

Dave Brewer
Provincial Co-ordinator
Search and Rescue
Provincial Emergency Program
1257 Lucking Place
North Vancouver, B.C. V7J 3L5 Telephone: (604) 984-4915

Dean Monterey, Manager
Search and Rescue, Coastal Sector
Provincial Emergency Program
207-815 Hornby Street
Vancouver, B.C. V6Z 2E6 Telephone: (604) 660-3725

Dave Brewer is the Provincial Co-ordinator of Search and Rescue, and Dean Monterey is the Manager of the Coastal Sector and is responsible for Search and Rescue.

The telephone number to call in case of emergencies - **24 hours a day** - is 1-800-663-3456. The numbers listed on Pages 9 and 10 of the Avalanche Resources Agencies list are not available 24 hours a day.

PUBLICATIONS

Butler, David R.

"Teaching Natural Hazards: The Use of Snow Avalanches in Demonstrating and Addressing Geographic Topics and Principles." Journal of Geography, Vol. 87, No. 6, pp. 212-227, November-December 1987.

The paper describes the types of avalanches, terrain, human adjustments to avalanche hazards, avalanche control, and hazard mapping. It illustrates how the study of avalanches can be incorporated in secondary school teaching of Geography or Earth Sciences. Teaching aids are described.

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