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inside

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Association
Box 2759
Revelstoke, BC V0E 2S0
250-837-2435
canav@avalanche.ca
www.avalanche.ca

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Presenting Partner of Columbia Brewery Avalanche Awareness Days

Avalanche News

Fall 2003 ❄ Volume 66

Avalanche News is the official publication of the Canadian Avalanche Association, a national non-profit society based in Revelstoke, BC. The goal of Avalanche News is to keep readers current on the issues and happenings affecting avalanche safety in Canada. It is published quarterly.

Avalanche News always welcomes your: opinions, teaching tips, photos, research papers, survival stories, new product announcements, product reviews, book reviews, historical tales, event listings, job openings, humourous anecdotes and really, *anything* interesting about avalanches or those involved with them. Help us share what you've got. Please send submissions to:

Editor, Avalanche News
Canadian Avalanche Association
PO Box 2759, Revelstoke, BC V0E 2S0
Tel: (250) 837-2435 Fax: (250) 837-4624
E-mail: editor@avalanche.ca

Editor & Advertising	Todd Beernink
Graphics Guru	Brent Strand

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Note: Digital contributions work best for us. For details, contact Brent Strand at canav@avalanche.ca.

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Editor's View

Fall is a time for change and there's plenty of that going on at the CAA right now. A quick glance at the contents of this issue shows you that the Canadian avalanche industry is on the cusp of some exciting changes. For an overview of these changes, check out Clair Israelson's Message from the Exectuive Director (p. 6).

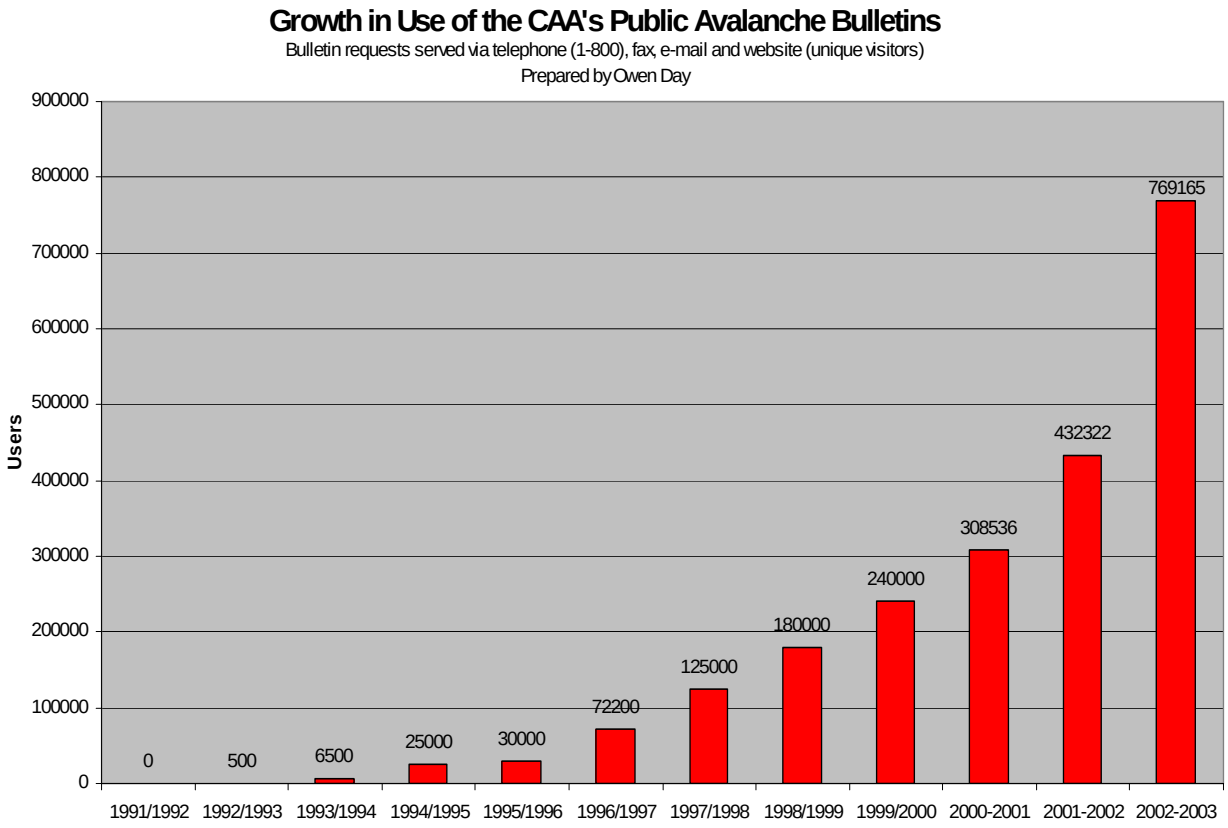
For the last 11 years, CAA members' collective sense of public responsibility has impelled us to fund public safety services such as the Public Avalanche Bulletins (PAB) with income earned from our private industry services[1]. In the past few years we've put a lot of effort into fundraising and sponsorship, which has allowed us to modestly increase the frequency and geographical coverage of the PAB. However, last winter's avalanche tragedies were the straw that broke the camel's back. The CAA's Board and management team were forced to accept the fact that **public demand (and need) for avalanche safety services is growing faster than the CAA can raise money.**

A consultant's report prepared last spring concludes that demand for public avalanche safety services will continue to grow and that public avalanche programming in Canada needs improvement. These themes are echoed in the avalanche reports recently released by Parks Canada (a summary of findings and recommendations is on p. 10) and the Strathcona - Tweedsmuir School.

In recent years, Canadians have clearly stated their expectations that **government should play a key role**, if not a lead role, in protecting the public from life-threatening natural hazards like West Nile virus, SARS, mad cow, water in Walkerton, and forest fires in Alberta and BC.

From the standpoint of governments concerned with maximizing revenues and reducing costs, consider the very **costly effects of avalanches on the economy**. The BC government puts the value of a life lost in a highway traffic accident at $3.2 million. Direct costs to the province include the expenses of search and rescue, police, ambulance, coroners, media relations, hospitalization for the injured, and the social welfare costs of support to bereaved families. Last winter 24 persons died in avalanches in BC (and 5 in Alberta). By my arithmetic, the value of lives lost in BC alone was about $77 million. These costs are significant. Public avalanche programs reduce these costs; government investment in avalanche accident prevention makes good business sense. Further, winter mountain tourism generates more than $1 billion of economic activity each year in BC alone. It doesn't take an economist to figure out that the industry that spawns these revenues is worth protecting.

The BC government, aware of its public safety role, commissioned an **Avalanche Review** this past February. A team of consultants and a steering committee of avalanche experts worked for four months, and submitted their report to BC Solicitor General Rich Coleman at the end of June. As winter approaches, we wait for Mr. Coleman to show leadership by initiating a partnership with industry, the CAA, and the Alberta and Federal governments to deliver public avalanche programming. In recent weeks, we have seen provincial government take leadership for public safety, most notably through evacuation alerts when fire threatened human life or property. Like fire, avalanche dangers can be forecast with reasonable accuracy. It seems only reasonable that government should share the responsibility to ensure public avalanche warnings are available for mountain communities.



While we wait, the CAA is proceeding with plans to improve the frequency and geographical coverage for the Public Avalanche Bulletin (PAB). Three highly skilled avalanche forecasters have been recruited to produce these bulletins for western Canada seven days a week through the winter, funding permitting. We are fully committed to improving the PAB and other public programs by supplying the best possible scientific and technical expertise – all we need is a commitment for financial assistance from government to cover some of the costs involved.

Regardless of government funding for public safety services, the CAA will forge ahead with a new public program this fall: two **public safety seminars are scheduled for December 5 and 6** in Calgary and Vancouver. One of the key speakers at these seminars will be Werner Munter, creator of the highly controversial decision-making "3x3 reduction method," which is discussed on p. 39.

For those members who need new gear this winter, I think you'll be pleased to see some very generous offers from our sponsors appearing on the member portion of the CAA website this fall. Keep an eye out for a section titled Pro Programs where you can download the required forms. An example of the offers: Sportech Marketing, distributor for Marmot, is offering members a price break on the **ABS Avalanche Airbag System**. Check out the third-party report on this system on page 34 – it presents a strong, unbiased case for this avalanche gear, the only kind to actually prevent burials.

Until it snows,

Todd Beernink

Todd Beernink
Editor

1 E.g., membership dues, training course tuitions, industry service subscriptions, and project management fees from projects for the National Search and Rescue Secretariat.

Executive Director's Report

BY CLAIR ISRAELSON

In summer the CAA's work involves reviewing our programs, implementing updates and improvements, planning for the upcoming season, dialoguing with industry, governments, and other stakeholders, and attending to all of those details that contribute to successful operations in the winter months. This summer seemed to be especially busy; here are a few of the highlights.

CAA Purchases Office Building in Revelstoke

As approved by our Board of Directors, purchase of the office building on MacKenzie Plaza from the City of Revelstoke has been finalized. To ensure that the membership's interests are well served, we retained a certified building inspection engineer to assess the structure prior to finalization of the sale. At the end of his inspection I asked him what he would be putting into his written report. His response was: "This is one of the best built buildings in downtown Revelstoke, and it's in great shape. Buy it!" We did.

The CAA's future home at 110 Mackenzie Avenue, Revelstoke, BC.

The building has 3200 sq. ft. of office space on two floors, plus a 1600 sq. ft. basement for storage of materials and school equipment. It's perfectly configured for us, with wiring installed for computer networks and phones, excellent office layout, and great public access. We take possession on October 1, will have minor renovations and painting completed by mid-month, and be moved in to the new quarters by November 1. This investment will reduce our annual overhead / operating costs, provide the association with a tangible asset that reflects the CAA's credibility and reputation, and improve our public and community profile. Please come by and see the CAA's new home!!

BC Avalanche Review

BC Minister of Public Safety and Solicitor General Rich Coleman commissioned this review in February 2003, following two tragic avalanche accidents that took 14 lives. I understand that the completed document was sent to Minister Coleman on June 30, as per the review terms of reference. Since that time I've made several inquiries to BC Provincial Emergency Program officials regarding the process and timing for release of this document. Right now I don't know when this report will be made public.

I'm becoming increasingly anxious for Minister Coleman to release the report and make a statement regarding the BC government's response to key recommendations contained in the report. Until this is done the CAA can't start exploring partnerships with other government or private sector organizations, or begin the planning and organizing required to implement the report's recommendations.

It's clear that provincial and federal government agencies, the winter mountain tourism industry, outdoors clubs and groups, and individual Canadians from coast to coast have come to realize that we need to work together to improve public avalanche safety programs in Canada. It's also clear that we need a little time to recruit a few good people to design and build the information and warning systems that Canadians and international tourists expect. Public release of the BC Avalanche Review should be the first step towards improved programs that will save lives and restore BC's reputation as a world class winter mountain tourism destination. We need to take action, now, before we're into the winter operating season. By then it will be too late, again.

Project Funding Proposal: Avalanche Decision Framework for Amateur Winter Recreationists

The Parks Canada avalanche review (June 2003) provided the impetus to develop and sponsor this proposal for project funding

from the National Search and Rescue Secretariat's New Initiatives Fund. If funding is approved, the Avalanche Decision Framework for Amateur Winter Recreationists project will develop a new decision-making paradigm for non-professional decision-making in Canada.

The proposed three-year project will develop a practical, science-based decision framework for amateur recreationists to use when they are planning for, or traveling in, mountainous terrain in the winter. This new framework will provide amateur recreationists with better, simpler, and more easily understood systems (tools) to recognize and evaluate avalanche risk and make personal safety decisions.

As the avalanche safety community in Canada (and around the world) matures, it is becoming increasingly apparent that the decision-making systems we teach to amateur recreationists are well intentioned but structurally flawed. We are coming to appreciate that backcountry skiers/boarders, snowmobile riders, and out-of-bounds skiers and snowboarders do not have the theoretical knowledge or extensive mountain experience required to use "dummied down" versions of the "knowledge based" systems used by avalanche professionals. Over the past five years, amateur recreationists have accounted for 82% of avalanche fatalities, the majority involving skiers and snowmobile riders. A new decision-making framework and approach that recognizes and accommodates the cultural competencies of amateur winter recreationists is required. The new framework will empower these individuals with simple, clearly understood guidance tools for making life-saving decisions in mountainous winter terrain.

This project will develop scientifically valid, "made-in-Canada" decision frameworks for amateur recreationists for three distinct geoclimatic zones (Coast, Columbia, and Rocky mountains) in western Canada. The proposed research activities will provide new surveillance data and information on the risk propensities and demographic profiles of target groups, and identify the recurring patterns of avalanche accidents in these zones. The Canadian Avalanche Association's avalanche incident database will be redesigned to include more and better defined observations, and to facilitate cross tabulation of influencing factors, including human decision-making factors, avalanche terrain conditions, avalanche danger ratings, and snowpack conditions. This new data will facilitate more cost-effective and responsive prevention programming and enhance the capacity of the avalanche safety community to accommodate the projected increase in demand for public avalanche safety services in Canada. If funding for this project is approved, work will begin in April, 2004.

Project Funding Proposal:
Integration Strategy and Training for Managing Multi-Agency Avalanche Search and Rescue

This proposal for project funding from the National Search and Rescue Secretariat's New Initiatives Fund is being sponsored by the RCMP. If funding is approved, the Integration Strategy and Training for Managing Multi-Agency Avalanche Search and Rescue project will develop a consistent, integrated strategy for managing multi-agency avalanche search and rescue operations, and develop consistent, high quality on-line training for both professional and volunteer SAR responders in Canada.

In Canada, multi-agency responses to avalanche SAR events are common. All responders understand that minutes count and all possible resources must be mobilized to maximize the chance for victim survival. Highly publicized rescue operations last winter highlighted the need for a Canada-wide strategy to effectively integrate multi-agency responses to avalanche accidents. This project will develop a recommended framework of guidelines and protocols that will help responding organizations work together on avalanche rescues in a safe and effective manner. In conjunction with development of a Canadian framework for managing multi-agency avalanche SAR response, there is an urgent need to train individuals from all responder organizations to effectively play their role.

A key component of this integration strategy will be the development of distance learning tools (internet based training) for both professional and volunteer SAR responders in Canada. Organizations supporting this initiative will be demonstrating their due diligence by ensuring that all staff tasked to respond to avalanche accidents have taken adequate training to do the work safely. If funding is approved, work on this project could begin early next spring.

Public Avalanche Bulletin Services Team Selected!

In anticipation of some provincial and federal government funding for public avalanche warning services we have selected a three-person team of highly qualified forecasters to produce the CAA's public avalanche warnings for western Canada this coming winter. These experts will work approximately half time forecasting for the CAA, and work as avalanche professionals in industry for the other half of their season. This split is intended to keep all the forecasters engaged in both the academic and the practical sides of avalanche work. Please welcome the new CAA Public Avalanche Warning forecasting team!

• **Alan Jones, Coordinator, Public Avalanche Bulletin Services.** Alan is an APEGBC registered engineer, and did his MSc. avalanche research under Dr. Bruce Jamieson at the University of Calgary. For the past few years Alan has worked for the BC Ministry of Transportation – Snow Avalanche Section based out of Stewart, BC, and has also been involved as a consultant for avalanche projects in North and South America. Alan is an avid skier and climber.

• **John Kelly, PAB Forecaster.** JK has a BSc. in physics, and has worked for the avalanche control program at Rogers Pass for the past decade. In this capacity he has had extensive experience collecting and analyzing data for both highway and public warning programs, and preparing public avalanche bulletins. With his excellent computer programming skills JK has developed original software for the avalanche safety industry. He is an avid ski mountaineer, and is co-author of "Ski Touring in Rogers Pass." JK is fluent in both English and French.

• **Ilya Storm, PAB Forecaster.** Ilya will complete his Masters in Geographic Information Systems at the University of Calgary this fall. Ilya has extensive winter mountain experience in the Rockies, Interior and Coast ranges, and has worked as a helicopter ski guide and computer programmer for Mike Weigele Helicopter Skiing. Ilya has been spending his summers guiding remote eco-tourism adventures.

CAA Data Management Initiatives

At last spring's AGM there was strong industry support for the CAA to begin working toward improved technical capacity for sharing data and information between industry operators, the Meteorological Service of Canada, government agencies, researchers, the CAA and the public. The overwhelming conclusion is that the time is right, and that a collaborative effort is required to ensure the products developed facilitate efficient and cost effective information systems tools that are compatible with whatever data systems are being used by these diverse partner organizations.

An Information Technologies Committee has been struck, and in the next short while will likely be empowered by our Board of Directors as a CAA Standing Committee. We have also contracted Roger Atkins and Pascal Haegli to work with the all stakeholders to develop a strategic plan document for a Canadian avalanche information technologies system. Your input into their work will ensure that new information technologies that are developed will be appropriate and improve your operational effectiveness.

The CAA has also retained Ryan Gill to manage the growing demands for data management and computer systems support here at the Canadian Avalanche Centre in Revelstoke. As the Canadian avalanche safety community grows and matures, this data management and information systems development will help us work together in an effective and cost efficient collaboration.

Forest Industry Safety Association (FISA) Initiatives

FISA develops safety training programs for the BC forest industry. BC Workers Compensation Board regulations require employers in the forest sector to provide avalanche safety training for all forest workers that may be exposed to avalanche dangers in the course of their work. FISA has approached the CAA with a request for our collaboration to develop standardized curriculums and training materials. Once approved by FISA and the CAA, qualified instructors will use these materials to deliver the training at forestry work sites across BC.

Over the summer months several meetings have taken place between the FISA team and CAA representatives Dave Smith (Chair, CAA Education Committee), Janice Johnson, Peter Kimmel, Jim Bay, Chris Stethem, myself, and others. A wide variety of issues have been explored and many have been resolved. I feel confident that this initiative is fully in keeping with the CAA's mandate for avalanche safety training support to industry. As these FISA training programs become developed, I believe they will provide expanded employment opportunities for CAA members with proven skills and experience in the forest sector.

As we move into the fall and begin preparing for the upcoming winter season, the CAA's Board of Directors, Committees, and the staff here at the Canadian Avalanche Centre will be working hard to provide you with improved support and services. If you have any thoughts or suggestions on how we might better serve our community, please contact me at clair@avalanche.ca or phone me at 250.837.2435.

Help BC forest fire fighters! Pray for snow!

Clair Israelson

canadianavalancheassociation
Box 2759, Revelstoke, BC V0E 2S0 ❄ ph: (250) 837-2435 / fax: (250) 837-4624 ❄ email: canav@avalanche.ca / web:

July 17, 2003

Mr. Wayne Stetski
Regional Manager,
Environmental Stewardship Division
Ministry of Water, Land & Air Protection
205 Industrial Road "G"
Cranbrook, BC V1C 7G5

Re: Kokanee Glacier Cabin, official opening celebrations

Dear Wayne;

It was a privilege to represent the Canadian Avalanche Association (CAA) at the official opening celebrations for the Kokanee Glacier Cabin in the Nelson area last weekend. The vision, determination and hard work by management and staff of BC Parks, the Friends of West Kootenay Parks, the Kokanee Glacier Alpine Campaign, the Alpine Club of Canada, and all the volunteers and paid craftsmen that designed and built the cabin was evident. Working together, you folks have created a legacy that will benefit present and future generations of Canadians. Everyone involved has good reason to be very proud of what has been accomplished. The new cabin will be a place where visitors will learn to respect and live in harmony with nature, and to tread softly in a grand and powerful mountain environment. The Canadian Avalanche Association is pleased to have played a supporting role in these efforts.

I wish to publicly acknowledge and thank you for the foresight shown in the planning stages of the Kokanee Glacier Alpine Campaign. The decision to promote avalanche safety with funds raised in excess of cabin construction costs resulted in a $40,000 contribution the CAA's public avalanche bulletin in the winter of 2001-02. That winter an unexpected cut in public sector support had created a financial crisis for the CAA's public avalanche bulletin program. Support from the Kokanee Glacier Alpine Campaign, through the Canadian Avalanche Foundation, allowed us to continue this valuable public service through the entire winter season, and increase bulletin frequency from two times per week to three. I am confident that this generous support prevented avalanche accidents and saved lives.

For many years the CAA has been looking for a quality location for avalanche training courses in the Kootenays. Your decision to offer the new Kokanee Glacier Cabin to the CAA Training Schools as a venue for avalanche training courses will generate safety benefits for many years to come. Young Canadians training for careers in avalanche work, or simply wishing to learn about avalanches, will now be able to spend 24 hours of every day of their week-long courses in this spectacular setting. The cabin is designed to serve as a quality classroom, and the adjacent terrain is superb for teaching and learning. I believe that the families who attended the opening ceremonies to honor loved ones who lost their lives in avalanches in Kokanee Glacier Provincial Park will be pleased with this improved capacity for quality avalanche safety training in British Columbia.

Finally, I wish to reaffirm the CAA's commitment to work with BC Parks, the Alpine Club of Canada, the Friends of West Kootenay Parks, and other stakeholders to develop quality avalanche awareness programming and safety materials for winter visitors to Kokanee Glacier Provincial Park. We know that our work to reduce avalanche accidents is not over. I believe we agree that we need to work together and escalate our efforts to inform and educate all Canadians of the risks and joys of our mountains in all seasons of the year.

Congratulations and best regards,

Clair Israelson
Executive Director
Canadian Avalanche Association

Cc: Mr. Carl Hannigan, VP Facilities,
The Alpine Club of Canada

Mr. Bill Bryce, President
Friends of West Kootenay Parks

Ms. Mary Krupa
Morningstar Enterprises

Mr. Chris Stethem, President
Canadian Avalanche Foundation

Hon. Joyce Murray, Minister
BC Ministry of Water, Land & Air Protection

Parks Canada Working to Implement Recommendations of Backcountry Avalanche Risk Review

BY BILL HUNT

September 2, 2003

BANFF, AB - Parks Canada is working to implement the recommendations of an independent review panel it established last winter to review winter backcountry activity and risk in the mountain national parks of Canada. Parks Canada is hiring a senior public safety specialist to develop a comprehensive work plan for implementing the recommendations.

The review panel's report contains 36 recommendations intended to enhance backcountry safety, ensure that users understand the risks involved when they undertake backcountry activities, and make sure that emergency response systems are as effective as possible.

Several of the report's key recommendations are designed to ensure that inexperienced backcountry users fully understand the risks involved when they undertake backcountry activities. In particular, it supports the initiation of an expert-based review of the language used in the current avalanche danger scale to make it more understandable and useful to backcountry users, as well as to include the concept of consequences in the risk rating scale. The report states that the current five-point avalanche warning system developed by the Canadian Avalanche Association (CAA) is robust and effective for experienced and well-informed backcountry users.

The report also recommends the development of a first-level hazard icon and signage system for the backcountry to help less experienced users evaluate risk levels, and the development of new icons for the daily Avalanche Bulletin produced by Parks Canada.

The panel reviewed current leadership certification and travel restriction protocols in the mountain national parks, as well as Parks Canada's backcountry avalanche risk management system. The panel concluded that "proposing fundamental changes to the policies and practices for visitor management in the backcountry of the national parks is not warranted."

A key recommendation in the report was for Parks Canada to require not-for-profit custodial groups proposing to use difficult terrain or back country areas presenting high-risk winter conditions to make use of a certified guide.

Parks Canada places high priority on ensuring that individuals or groups can access the information they need to make their own decisions on whether to undertake an activity in the backcountry or not, based on their own level of risk tolerance.

As part of its commitment to public safety, Parks Canada will implement the panel's recommendations. Several of those recommendations will be acted on immediately, while some will require additional work by Parks Canada or the involvement of other parties and may take longer to implement.

The Backcountry Avalanche Risk Review was prepared by former BC provincial parks Assistant Deputy Minister Denis O'Gorman, University of Calgary Risk Communications expert Dr. William Liess, and Phil Hein, a mountain guide trainer. An electronic copy of the report is available upon request from: helen.kennedy@pc.gc.ca.

canadianavalancheassociation
Box 2759, Revelstoke, BC V0E 2S0 ❄ ph: (250) 837-2435 / fax: (250) 837-4624 ❄ email: canav@avalanche.ca / web:

July 8, 2003

To: Mr. Charlie Zinkan
Executive Director, Mountain Parks
Parks Canada

From: Clair Israelson
Executive Director
Canadian Avalanche Association

Re: **Parks Canada's Backcountry Avalanche Risk Review**

Thank you for providing this report to the Canadian Avalanche Association (CAA). The CAA fully supports the directions proposed by the review team to improve the public's perception of avalanche risk, and how to improve communication of risk to target audiences. The CAA looks forward to collaborating with Parks Canada, other federal and provincial stakeholders, and university researchers to develop improved public avalanche safety programs that will reduce injury and loss of life in Canadian winter mountain recreation.

In recognition of public and stakeholder expectations for timely action in these matters the CAA, in cooperation with key staff from Parks Canada and other organizations, is currently working on development of a project to improve avalanche risk perception and communication systems. A planning meeting of key stakeholders (including Parks Canada) was held in Golden, BC on June 24th to scope the issues and identify project needs, key elements, and structure for a re-designed public avalanche warning system for Canada.

We are looking forward to working closely with you and your staff to implement those recommendations contained in the Parks Canada backcountry avalanche risk review that invite CAA collaboration.

Congratulations,

Clair Israelson
Executive Director
Canadian Avalanche Association

2002-2003 A Tragic Avalanche Season

BY EVAN MANNERS

In Canada, where avalanche involvements can and have occurred in every month of the year, the avalanche "season" is considered to be from September 31 until October 1 of the following year. So, by the time you read this article, hopefully the worst season for recreational avalanche tragedy in Canada's history has come to a close without further incident. Twenty-nine people lost their lives last year in Canadian avalanches. To put last year into perspective, there have only been two years with worse statistics: 1910 when 62 people were killed in Rogers Pass on the railroad, and 1965 when 35 fatalities occurred, with 34 of those being industrial accidents.

The 2002-2003 fatality statistics tell an interesting story of the true impacts of avalanches in terms of human tragedy and associated costs to society. Of the 29 fatalities, 25 occurred in BC and 4 in Alberta. When we look at where those people were from, we see that 9 were BC residents, 13 were from Alberta, 6 from the US and 1 from France.

Date	Accident Location	Activity	Home Residence
December 28, 2002	Valemount, BC	Snowmobiling	Valemount, BC
January 5, 2003	Rossland, BC	Out of Bounds	Rossland, BC
January 20, 2003	Revelstoke, BC	Backcountry Skiing	Nelson, BC
January 20, 2003	Revelstoke, BC	Backcountry Skiing	Calgary, AB
January 20, 2003	Revelstoke, BC	Backcountry Skiing	New Westminster, BC
January 20, 2003	Revelstoke, BC	Backcountry Skiing	Truckee, CA
January 20, 2003	Revelstoke, BC	Backcountry Skiing	Los Angeles, CA
January 20, 2003	Revelstoke, BC	Backcountry Skiing	Littleton, CO
January 20, 2003	Revelstoke, BC	Backcountry Skiing	Canmore, AB
February 1, 2003	Glacier National Park, BC	Backcountry Skiing	Calgary, AB
February 1, 2003	Glacier National Park, BC	Backcountry Skiing	Calgary, AB
February 1, 2003	Glacier National Park, BC	Backcountry Skiing	Calgary, AB
February 1, 2003	Glacier National Park, BC	Backcountry Skiing	Calgary, AB
February 1, 2003	Glacier National Park, BC	Backcountry Skiing	Calgary, AB
February 1, 2003	Glacier National Park, BC	Backcountry Skiing	Calgary, AB
February 1, 2003	Glacier National Park, BC	Backcountry Skiing	Calgary, AB
March 12, 2003	Canmore, AB	Hiker	Canmore, AB
March 14, 2003	Lake Louise, AB	Snowshoer	Albuquerque, NM
March 17, 2003	Kokanee Glacier Park, BC	Backcountry Skiing	Seattle, WA
March 17, 2003	Kokanee Glacier Park, BC	Backcountry Skiing	Seattle, WA
March 20, 2003	Rocky Mtn. House, AB	Snowmobiling	Sylvan Lake, AB
March 26, 2003	Fernie, BC	Snowmobiling	Fernie, BC
March 26, 2003	Fernie, BC	Snowmobiling	Crows Nest Pass
March 26, 2003	Fernie, BC	Snowmobiling	Fernie, BC
March 26, 2003	Valemount, BC	Backcountry Skiing	France
March 27, 2003	Invermere, BC	Snowmobiling	Fairmount, BC
March 31, 2003	Fort St. James, BC	Snowmobiling	Germansen, BC
April 6, 2003	Golden, BC	Snowmobiling	Alberta
April 18, 2003	Blairmore, AB	Snowmobiling	Alberta

Update on Coroner's Reports

BY TODD BEERNINK

August 29th, 2003 – According to the BC Coroner's Service, final reports on the two most devastating fatal avalanches of last winter will finally be released this fall.

Both slides happened in the Revelstoke area. They resulted in seven fatalities each. The Durrand Glacier slide happened 30km northeast of town in January and the Cheops slide happened in Glacier National Park, 70km east of Revelstoke, in February.

These two incidents drew international media attention and requests for the Coroner's Service to share basic avalanche data as soon as possible to prevent future fatalities.

Revelstoke District Coroner Chuck Purse, who is handling the Durrand Glacier investigation, said today that he is "at the stage of finishing off recommendations which should take another week or two." Minor changes will then be made by the regional or the Chief Coroner's office and the final report should be available by the end of October.

Lisa LaPointe, Assistant Deputy Chief Coroner for BC, said that the majority of information has also been gathered on the Cheops incident. That final report can be expected "by the end of November."

The final reports can be obtained from your local regional Coroner's office upon written request or by emailing Coronerinfo@victoria1.gov.bc.ca

CAA Draft Minutes of Technical Presentations at the Annual General Meeting May 8, 2003

BY SUSAN HAIRSINE

Disclaimer: The minutes from the CAA's 2003 AGM have not yet been reviewed by all the presenters due to their lack of availability over the summer. Draft minutes are shown below; a final version should be available later this fall. If you would like a copy of the final version, please contact Susan Hairsine at mtnmgmt@monarch.net.

Robin Siggers – Chair:

Self-Organized Criticality for the Snow Slab ~ Dave McClung:

Dave discussed the application of general critical systems and questioned if it is possible to outline some features for avalanches that could be applied to other critical systems (i.e. landslides, etc.).

He reviewed some laws of physics and stated that in his research he was looking for general principles pertaining to critical systems.

Dave reviewed historical research. He began with sand pile avalanches and a model that was developed. The work evolved to rice pile avalanches, water droplet avalanches, and application to earthquakes, landslides, and models with small data sets.

The definition of self-organized criticality is a critical system or phenomenon, scale invariant with respect to size, or scale invariant with respect to time arrival.

Dave explained the differences between critical systems and non-critical systems.

The fundamental size parameter is the slab thickness. When avalanches release under storm loading, they mostly occur during and immediately after a storm. He concluded that the snow slab is more likely a non-critical system rather than a critical system.

Dave discussed fractals and scale invariance. For a system of criticality we need to demonstrate scale invariance for both sizes. He showed some graphs with data pertaining to scale invariance.

Dave then concluded that scale invariance with respect to avalanche size is represented by "D." Skier triggering data show a different asymptotic relationship with D compared to data from a mix of triggers. There are also time signatures, which are the correlations between events in relation to the time scale and large fluctuations.

Some time series of natural avalanches at Bear Pass and Kootenay Pass over a twenty-year period were shown on a graph. Time responses are very narrow; the avalanches release during storms or immediately after, that was shown on graphs. There is correlation between time lags but it is not fractal.

Field observations suggest that the snow slab is non-critical. Scale invariance is not satisfied for the fundamental quantity. Temporal response to loads is narrow and does not appear to be fractal. Loose snow avalanches are analogous to sandpile avalanches.

Dave closed by stating that the systems of criticality hold great promise but need redefinition to apply to real events. He thanked his program sponsors.

Numerical Avalanche Prediction for Bear Pass ~ James Floyer:

James discussed a model he has been building for Bear Pass. He reviewed the snow and avalanche climate in Bear Pass and type and source of data. He then showed a map of the avalanche paths with avalanche occurrence data.

The purpose of the study was to build an avalanche prediction model for Bear Pass and to understand the variables most important in numerical avalanche prediction, and determine whether splitting the pass into sub areas would improve the prediction rates.

James discussed the optimal variable set and the discriminant function and showed a graphic analysis of this. He talked about his prediction model, and limitations and time series analysis approach. He also discussed the nearest neighbor model. The actual prediction rate in discriminant analysis was 72% and the nearest neighbor model was 69% (Mahalanobis model, and cornice nearest neighbors).

The limiting factor is the data quality he is using. Manual weather does not always reflect start zone conditions. James would like to include hourly remote weather station data and time series analysis approach. He discussed his work in progress and stated it looked very promising with high resolution.

When employing a classic approach the prediction rate is 72%, with the most important variables. The nearest neighbours analysis gives the most useful output however. In Canada, uptake of the numerical prediction models has been very poor. Numerical models need to be accurate, quick and simple to use, and useful for the forecaster.

James concluded that better communication between research institutions and forecasters is required. He thanked his project sponsors.

Historical InfoEx Data - Large Scale Instability Patterns ~ Pascal Haegeli:

Pascal discussed parsing of InfoEx text files, the current state of InfoEx database, and large scale snow instability patterns.

Pascal explained that he was interested in avalanche forecasting modeling on a large scale and decided that the InfoEx data set seemed to be ideal for studying this question. He reviewed the components of the InfoEx data set and added that this data is received from approximately 70 operations and covers three distinctly different snow climates.

Pascal discussed the time required to extrapolate comments from text. He developed a parsing code to extrapolate these comments and separate the comments into three fields. His program can look for key words and he showed the various tables that make up the database. He has more than 50,000 avalanche records. Pascal thanked his research team.

Pascal concluded that the benefit of his research project was that the data can be used for scientific study and may lead to more efficient effective use of the InfoEx.

Large Scale Snow Instability Patterns in Western Canada:

Pascal looked at differences in stability ratings from a variety of operations in areas on the Coast, Columbias, and the Rockies. He showed the different definitions of stability ratings and the patterns observed in these areas. The preliminary work has been completed. His research indicates that it takes longer on the Coast to get back to fair from poor. The lowest number of reported persistent weak layers is in the Rockies.

Pascal then discussed weather observations in the data set:

- increasingly warmer temperatures at the Coast
- lower wind speeds in the Coast and South Columbias
- an average snow depth maximum in the North Columbias
- the number of precipitation events is higher in the North Columbias and Rocky Mountains
- the duration of large precipitation events is significantly shorter in the Coast Mountains

Pascal concluded that the InfoEx contains a valuable data set, and is one of the most comprehensive backcountry avalanche data sets available. It has many potential benefits for research and users, and this first analysis of studied spatial variability of stability ratings. He closed by thanking the database team at UBC and all the avalanche safety programs that contributed to InfoEx and all the programs that sent their geographical data.

Penetration of Avalanches in Forest Cover ~ Geoff Anderson:

Geoff studied avalanches that occur in forested terrain and forest damage resulting from snow avalanches in timber harvested terrain. His research examined two main questions:

1) How do timber harvesting practices affect potential avalanche terrain?
2) What can be done to minimize the effects of timber harvesting on avalanche terrain?

Logging is extensive in mountain areas of British Columbia and creates avalanche areas on slopes that previously were not in danger of failing. This can cause millions of dollars lost, carry debris that impacts rivers and creeks, and pose hazards to highways, towns, or structures.

He tried to determine which physical terrain characteristics lead to avalanches that destroy forests. There was a scarcity of data for forest avalanches he used in his study and the study area that was comprised of 300 documented avalanche paths.

Geoff defined his data collection methods. He was interested in damage to forests and had to define "forest" as five meters in height. The snowpack can exceed two meters. Damage is classified as when trees have been overturned and/or trees have been fractured. He showed an example in of this in Haylmore Creek.

Geoff discussed GIS modeling in this application and the procedure he used. Avalanche paths are digitized to calculate profiles and damage areas. He also discussed the probability modeling he is using. Approximately 32 new paths will be added to the database this summer.

Geoff concluded that initial results were promising, and it will be possible to provide significant cutting recommendations to the timber harvesting industry. Initial results suggest wide, vertically shallow cutblocks are preferred to vertically deep cutblocks.

A Fatal Avalanche in Guided Snowmobiling ~ Rod Gibbons:

Rod discussed a fatal avalanche on March 27, 2003 in Brewer Creek, near Invermere, BC He had been asked by the Coroner to do a site and snowpack evaluation and was involved in rescue operations. Rod discussed the data of this size 3 avalanche that ran 400 vertical meters. The avalanche occurred in the afternoon when the radiation was intense. He showed photos and discussed the avalanche characteristics.

A snowmobile guide was caught and buried while guiding 12 guests who were following him. One of the group managed to outrun the avalanche and his machine stopped about four meters from the flank. The victim was buried very deeply (7.3 meters).

Rod, seven persons from RK Heli Skiing, plus four ski patrollers and one CARDA dog responded through PEP. Other searchers joined that evening. Rod added that it is very strange to get an eight meter indication on a beacon. It was 7.3 m to top of victim, and seven tier lifts were required in this very major excavation. Darkness precluded events once the victim was partially uncovered, and they returned the next morning to complete the extraction.

BC Avalanche Safety Review ~ Clair Israelson:

A BC Avalanche Review representative had been invited to do a presentation but was not in attendance, so Clair briefly outlined the history of the BC Avalanche Review. The review was initiated following the two major avalanche accidents in early winter. In early February a group of industry leaders met in Golden to come up with strategies to improve avalanche protection in Canada, and to engage both politicians and industry operators. A CAA organized contingent comprised of Bill Mark, Bruce Jamieson, Clair Israelson, and Jim Spencer met with Solicitor General Rick Coleman in February, and discussed the pressing issues of avalanche safety. Minister Coleman agreed to a review of avalanche safety issues in British Columbia.

Ross Cloutier was hired by the Province to present a report on avalanche safety issues by June 30, 2003. One meeting in April was held with federal and provincial departments as well as other stakeholders. Although the CAA is a key player in this review, it will be an independent study carried out by the Province.

Parks Canada Review ~ Denis O'Gorman:

Denis explained that this is separate but parallel to the BC Review initiated for much the same reasons. Their panel is comprised of Phil Hein and Dr. William Leiss. The project was announced in mid April and they have been looking at winter backcountry activities in mountain national parks. The scope of review includes risk management practices, risk perception and communication, access to emergency notification, leader certification, and travel restriction concepts.

Denis discussed the approach they are following which includes a documentation review, discussions with field staff and other key organizations, questionnaires, liaison with the BC Review, and a review of best practices. Their timeline is to have the report completed by June 30, 2003.

CAA Future Challenges and Opportunities ~ Bill Mark:

Bill gave the membership a review of the Board of Directors' and past Presidents' vision for the Association. One of the challenges of a growing association is that it is now difficult to get feedback from the entire membership. This session is intended to update the membership on what your elected representatives, the Board, is doing to move the Association forward. In spring of 2000, the Directors and past Presidents had a visioning process that created a five-year plan to be reviewed in 2005. However, the Board felt that the Association was well on the way to fulfilling those objectives, plus with all the occurrences this year, the Board and past presidents reviewed and have updated the CAA mission and vision, to best fit the challenges of the future.

Bill discussed the new mission and vision statements that were drafted at the spring Board of Directors' plenary session.

Canadian Avalanche Association Mission Statement:

"The CAA is dedicated to bringing the avalanche community together to develop knowledge and understanding of avalanches, facilitate communication, promote professionalism, and provide quality avalanche education."

Vision Statement:

The CAA is Canada's national organization promoting avalanche safety.

The CAA is a non profit society that will:

- Promote professionalism in Canadian avalanche safety programs
- Enhance and promote public avalanche safety programs through partnerships with the private and public sectors
- Facilitate information and technology transfer
- Develop, maintain, and deliver avalanche education programs
- Promote avalanche research and development
- Ensure value of membership and encourage participation

Bill then identified and explained what key areas the Association is engaged in during the next few months. Continued Professional Development (CPD) and professionalism is ongoing. Enhancing and promoting public avalanche safety means partnering with government and the private sector, while maintaining financial sustainability of the CAA.

Facilitation of information and technological transfer is occurring with InfoEx communication enhancements, Avalanche News upgrade, and web site enhancements.

Phase 2 of the Education Visioning Project is underway to develop and maintain avalanche education programs. The Board has committed $20K Intellectual Property Renewal Fund (IPRF) to continue this initiative. As well, we will contribute $10K in funds to improve snowmobile education if matching funding is available from the Snowmobile Federation (BC and Alberta). The immediate upgrades required in CAATS will cost approximately $18K in IPRF.

To promote avalanche research and development, the Board has offered support to the University of Calgary's avalanche research chair.

"Avalanche Accidents in Canada, Volume 5," is underway with phased data compilation, book publication scheduled in five years with a partnership with the University of Calgary.

The Board has reallocated 80% of dues to member services to ensure value of membership and encourage participation. This higher allocation of resources to member services will fund "member only" website enhancements, member pricing policy, and pro deals.

Bill asked for the members' participation and stated we can promote ideas through committees and Board of Director representation.

CAA/CAC Sustainability Issues ~ Clair Israelson:

Clair discussed CAA client services, financial sustainability, and partnership opportunities. Clair provided a historical perspective of the CAA.

Clair reviewed the various operating centres and how the CAC staff had defined what services make up these cost centres. Association activities, CAA Training Schools/ CAATS, industry services, members services, public safety services (PAB and RAC), and special project management fees have helped cover costs.

Clair showed the 2002/03 cost centre revenue and expenses. CAATS, Industry Services, and Member Services are financially secure and sustainable. Association Activities and Public Safety Services are faced with huge growth in demand for services, and insufficient revenues to pay for the services being requested / expected by the public.

He discussed the National Avalanche Centre concept, which would include the CAA and provincial and federal government sponsorship. Public services costs would be shared 1/3, 1/3, 1/3. Mandate and governance structure is required, as well as coordination with various stakeholders to avoid duplication. Clair outlined a possible model for a Canadian Avalanche Centre.

Bill Mark facilitated a discussion with the membership about the CAA:

Comments from the floor:

- Anyone working in the avalanche industry should be a member of the CAA
- The CAA should promote value of membership and promote ownership, pride, and commitment in the community (i.e. elite without being elitist)
- Include a one year membership with course registration and then actively canvas for membership renewal in future years
- InfoEx subscriber organizations should be associate members
- More focus on development for affiliate members and don't just target professionals in CPD – ongoing skill development
- Investigate opportunities for affiliates to have a day out with a professional member to examine snowpack, terrain, etc.
- The CAA has developed sufficient expertise and can maintain our position
- There is an opportunity to involve public sector financing and commitment following this tough winter
- Develop a more formal strategy to linking energy and information technology transfer, weather data, etc, in a relationship with our neighbors to the south
- Continue to develop risk management strategies where we draw on other experiences from other organizations into our program – seminar, guidelines, etc.
- Issue name tags at the AGM – lots of new people in the meetings now
- Members should direct any comments re: provincial review to the BOD or Clair
- Give members information re: review, etc, in as timely a fashion as possible

Upcoming Events

October 15-18, 2003
SAR*SCENE* 2003

SAR*SCENE* 2003 provides a forum for Search and Rescue (SAR) personnel to share expertise and experiences and to find out about new SAR technologies. More than 600 participants are expected from air, land, and marine organizations across Canada – Department of National Defence, Royal Canadian Mounted Police, Environment Canada, Department of Fisheries and Oceans, Canadian Coast Guard, Canadian Heritage/Parks Canada, provincial and municipal governments, and numerous volunteer organizations. SAR organizations from other countries will also attend.
Location: Kingston, ON
Contact: Lynn Tremblay, Registrar; *Tel:* 1-800-727-9414 or (613) 996-4737*; E-mail:* ltremblay@nss.gc.ca
Web: www.nss.gc.ca/site/SARScene/workshop/2003/index_e.asp

October 29, 2003
Harmony Benefit Concert

What: A benefit concert for the CAA organized by Banff musician Gary Gonis (see story page p.59). Featuring Lori Reid, Lin Elder, Jenny Allen, Marty & Russ of New Moon, Sarah Harper (aka Lightning Girl), Gary himself and his band Et-Al.
When: Wednesday, October 29, 2003. Silent auction at 6:30 pm, musical entertainment at 8:00 pm.
Where: Fairmont Banff Springs Convention Theatre, Banff, AB
Info: Contact Garry Gonis at (403) 760-5059 *Tickets:* $35

December 6-7, 2003
Public Avalanche Workshop 2003: Managing Your Risk in the Backcountry

What: The CAA will host one -day workshops in Vancouver and Calgary to help core backcountry users better understand and manage their personal risk, and prevent avalanche accidents. Experts in backcountry avalanche accident prevention from Canada, Switzerland, France and the USA will discuss the challenges of decision making in the mountains and the human factors that influence our actions. They will share avalanche research results that will help us understand the nature of the risks we face and present the latest strategies for backcountry avalanche safety. We are especially pleased to present Werner Munter, creator of the revolutionary "Reduction Method" of decision making, which is widely used in Europe - could his approach work in Canada?
Where & When: Vancouver on Saturday, December 6th and Calgary on Sunday, December 7th.
Info: Stay tuned to www.avalanche.ca for updates. An e-mail update will be sent to all CAA members once the details are finalized.
Contact: Todd Beernink, Sponsorship & Events Coordinator, at (250) 837-2435 or todd@avalanche.ca.

January 9-11, 2004
6th Annual Avalanche Awareness Days

What: The CAA's largest public safety event! Grassroots events across Canada showcase the difference avalanche awareness can make in the lives of backcountry enthusiasts. Last year's volunteers and participants reached tens of thousands with their message and raised over $15,000 to support the Public Avalanche Bulletins.
Where: Celebrated in over 30 mountain communities across Canada.
Who: Want to give back to your mountain community? Give a hand to the CAA members, SAR groups, Parks staff, ski & sled clubs, and patrollers who organize local events for those that want to learn how to enjoy winter in the mountains safely.
Info: For those interested in helping organize local events, contact Todd Beernink, the CAA's Sponsorship & Events Coordinator, at (250) 837-2435 or todd@avalanche.ca. For all other info, stay tuned to www.avalanche.ca.

January 9, 2004
CAF Black Tie Dinner

In conjunction with Avalanche Awareness Days, the Canadian Avalanche Foundation is planning a dinner fundraiser in Calgary on Thursday, January 9th. The location and details of the event are yet to be confirmed.
Info: Contact info@avalanchefoundation.ca for more details.

Upcoming Events

April 12-16, 2004 (moved from April 21-23, 2004)
Symposium of Snow and Avalanche in Warm Climatic Zones

The Snow and Avalanche Study Establishment (SASE), a research and development organization dedicated to controlling the avalanche problem in the Indian Himalaya, announces the first call for papers for an international symposium on snow and avalanche in warm climactic zones. The focus will be on the mechanical and physical behavior of snow found in warm conditions, since little research has been done on snowpacks at temperatures above 10 degrees Celsius. The symposium organizers propose publishing the proceedings in the Annals of Glaciology.
Where: Manali, India
Info: Contact S.S. Sharma, SASE, RDC, Him Parisar, Sector 37A Chandigarh UT 160036, India; *Tel:* 0172 699804-06; fax: 0172 699802. *E-mail:* sase_afg@yahoo.com or root@sasehq.ernet.in.

Arpil 19-24, 2004
Western Snow Conference 2004: Snow, Friend or Foe?

The purpose of the Western Snow Conference is to provide a forum for individuals and organizations to share scientific, management, and socio-political information on snow and runoff from any viewpoint and to advance the Snow and Hydrologic Sciences. Organizers are now accepting papers for oral and poster presentations.
Where: Delta Hotel Vancouver Airport in Richmond, BC.
More info: www.westernsnowconference.org
Contact: Jon Lea, Program Chair; *Tel.*: (503) 414-3267; *Fax* (503) 414-3277; *E-mail*: jon.lea@or.usda.gov

Early May, 2004
Avalanche Photography Contest

When: CAA AGM 2004
Location: Penticton, BC
Contact: Brent Strand; *E-mail:* canav@avalanche.ca
Notes: Enter to win incredible prizes, not to mention the glory of having your photo published in the Avalanche News or on-line. There will be three categories: CAA members in the field, events & occasions and, of course, avalanches! All images entered will be displayed at the next AGM. Stay tuned for more details.

July 5-8, 2004
5th International Conference on Snow Engineering

The Snow Engineering Conference is an established forum for snow practitioners and researchers to present, discuss, and exchange research results. Unlike other snow conferences, Snow Engineering is dedicated to the application of snow science to industrial and engineering applications. The sponsor of the conference is the Swiss Federal Institute for Snow and Avalanche Research SLF, Davos. For more information on the conference, visit www.snow2004.ch.
Location: Davos, Switzerland
Info: Contact: Snow Engineering Secretariat; *E-mail*: snow2004@slf.ch

September 19-24, 2004
International Snow Science Workshop (ISSW) 2004

Snow scientists and avalanche practitioners from many nations will meet in Jackson Hole, Wyoming to present papers and exchange information at the International Snow Science Workshop 2004. ISSW 2004 will continue the theme of past workshops "A Merging of Theory and Practice." The American Avalanche Institute, Jackson Hole Mountain Resort, and United States Forest Service will be hosting this event.
Where: Teton Village, Wyoming
More info: www.issworkshop.org
Contact: American Avalanche Institute, PO Box 308, Wilson, WY 83014; *Tel.*: (307) 733-3315; *E-mail*: issw@aol.com

"Demand is Huge" for Snow Science

BY TOM KEYSER, PRINTED BY PERMISSION FROM THE PEGG, THE OFFICIAL NEWSPAPER OF THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS AND GEOPHYSICISTS OF ALBERTA (SEPTEMBER 2003 EDITION)

It's the bright side of an otherwise disturbing picture. Alberta's engineers in training have become passionately interested in the problematical study of avalanche prediction and control.

Dr. Bruce Jamieson, P.Eng., bears witness to the fact. He heads the modest (three graduate students, two winter technicians) Applied Snow and Avalanche Research Group at the University of Calgary. Limited room within the program has forced him to discourage large numbers of grads anxious to take part in this important project.

"The demand is huge," says Dr. Jamieson, an adjunct associate professor of civil engineering. "I'm told I turn away more grad students than any other professor in this department." Dr. Jamieson is among the country's foremost experts in an area which has assumed particular significance for concerned Western Canadians. During the last five winters, an annual average of 16 people in Canada have lost their lives in snow avalanches, and the deaths are usually in Western Canada.

Dr. Bruce Jamieson, P.Eng., photo
Fracture Measured University of Calgary researchers start measurements at the crown fracture of a slab avalanche in the Cariboo Mountains. The avalanche was triggered by a snowmobiler traversing near the top left corner of the photo.

Researchers such as Dr. Jamieson, a lifelong mountaineer who spends much of his winters testing, measuring and assessing snowpack conditions in remote field stations, are fighting the clock to reduce those numbers.

"Right now we have so many more questions than we have answers," he explains. "There's a huge need for more research.

"We still have a hard time determining whether a particular slope is likely to slide or not, whether it can be skied upon or not, on a particular day."

Further Funding Needed

Along with his colleagues within the Canadian Avalanche Association (he chairs the CAA's technical committee), Dr. Jamieson is grateful for the corporate and government funding already set aside for their work.

Now he's hoping federal officials will come up with a bit more so the CAA can build from research by adding an operational public safety program.

The CAA is aggressively seeking relatively modest sums to increase existing forecast areas in Western Canada from five to as many as nine, while seeking to limit the size of each area. At the same time, the CAA seeks to boost its number of weekly status bulletins from three to seven.

Dr. Jamieson estimates such improvements would cost an additional $500,000 to implement — a bargain price when measured against the lives they might save.

Last Winter's Tragedies

Last winter's depressing death toll is more than enough to foster a sincere hope that such proposals meet with a sympathetic hearing. Among the avalanche victims were seven students from Strathcona-Tweedsmuir School, near Okotoks, who died in February.

About 10 days earlier, another group of seven perished in the mountains, including Naomi Heffler of Calgary, a certified ski instructor, a U of C chemical engineering graduate who had studied with Dr. Jamieson.

Naomi's tragic death inspired her father's employer, Alliance Pipelines, to establish the $25,000 Naomi Heffler Memorial Scholarship in Avalanche or Snow Science at U of C.

But more work remains. Dr. Jamieson, his research team, and the Canadian Avalanche Association are doing a heroic job. And every Canadian with even the slightest connection to the great outdoors shares a stake in their efforts.

3rd Canadian Conference on Geotechnique and Natural Hazards

BY CHRIS STETHEM

The 3rd Canadian Conference on Geotechnique and Natural Hazards (Geohazards 2003) was held in Edmonton on June 9 and 10, 2003. Almost 200 people attended, most from across Canada, as well as Norway, Taiwan, Japan, India, and the United States. The presentation topics included seismic hazards, flooding and natural dams, slope mass movements, submarine instability, snow and rock avalanches, risk assessment, and climatic controls for natural hazard events. A variety of exhibitors were set up to display products, including the CAA sponsor Vertec / Janod.

Bruce Jamieson and I represented the Canadian snow avalanche community. Bruce chaired the session on Snow and Rock Avalanches, within which he also presented an Alan Jones / Bruce Jamieson paper on Estimation of Friction Coefficients for Short Slope Dynamics Models. I was fortunate to present one of the keynote addresses for the conference, entitled Snow Avalanche Risk Management in Canada. Following the conference, Dr. Rejean Couture of the Geological Survey of Canada led a three-day tour of slope hazards in the Canadian Rockies. The field trip included a tour of the avalanche sites on the Sunshine Road in Banff National Park, led by Tim Auger of Parks Canada and assisted by Bruce Jamieson.

While the numbers of attendees from a snow avalanche background were few, there was a keen interest among the larger group in the snow avalanche phenomena. The thinking in several of the conference topics such as climate change, weather warning, and risk analysis could also be directly related to snow avalanches. Jim Bruce (Global Change Strategies International) gave one of the keynote presentations on Implications of Climate Change for Flood Damage Reduction in Canada. These predictions for change include an increase in global mean temperature (rising freezing levels), increases in winter precipitation in northern latitudes, increased frequency of heavy rainfall events (crusts), increased severity and intensity of winter storms, glacial retreat (changes in terrain), and earlier spring breakup.

More people lose their lives annually in Canada in snow avalanches than in any other of the natural hazards discussed at the conference. This is a strong motivation for future research and development of practices, which will hopefully increase the interdisciplinary involvement of natural hazards specialists.

Copies of the conference proceedings can be obtained from Corey Froese, the Technical Committee Chair for the conference (corey.froese@amec.com).

ATTENTION INDUSTRY EMPLOYERS

Increasingly the CAA is being approached by government departments and partnering organizations soliciting input or perspective on future policy direction, initiatives, and issues affecting the avalanche community in Canada. To ensure that we can inform you of these issues that affect your operations and solicit your feedback prior to responding to these inquiries, the CAA is creating a database of organizations and government agencies that contribute to avalanche protection in Canada.

We are compiling an industry employer contact list so that the CAA can improve our communications with you and your industry. We know who many of you are, but there are other industry partners out there who we may not be not aware of at this time.

If you employ avalanche workers in any capacity we would like to hear from you… today. Please contact the CAA and ask that your organization be put on our INDUSTRY CONTACT LIST. We assure you that this list will not be distributed to any third parties.

- Forestry
- Mining
- Rail
- Film
- Highways
- Ski Hills
- National Parks / Provincial Parks
- Snowmobile Organizations
- Ski Touring Operations
- Backcountry Hut Operations

Please contact Ryan Gill, CAA Data & Computer Systems Technician, at: ryan@avalanche.ca, by phone at 250.837.2435, or by fax at 250.837.4624 with the following information:

Organization name
Industry sector (see list above)
Contact person's name, position/title
Phone number
Mailing address
Email address

We thank you for your cooperation

canadianavalancheassociation

Spatial Variability of Stability and Fractures in Avalanche Start Zones: Results from the Winter of 2002-03

Cam Campbell[1] and Bruce Jamieson[1, 2],
[1]Department of Civil Engineering, [2]Department of Geology and Geophysics,
University of Calgary

During the winter of 2002-03 in start zones in the Columbia Mountains, the University of Calgary avalanche research team performed a total of 286 rutschblock tests in 13 different arrays and a total of 694 fracture resistance tests in 17 different arrays. The fracture resistance test is an experimental test that measures the energy required to cause fracture propagation in the weak layer which has been notched with a blade to a fixed distance (initial crack). The energy is applied dynamically to the top of a column by a drop hammer tester (Stewart and Jamieson, 2002). The Deep Tap Test is another experimental test in which a prescribed sequence of manual taps of increasing force is applied to a shovel blade on a snow column similar to the tapping used for the compression test. The main difference between the two loading methods is that with the drop hammer method, the impact force increases every load step rather than every ten load steps (taps).

In contrast to stability tests, the compressible near-surface layers must be removed to ensure that most of the energy delivered to the top of the column gets to the notched weak layer. However, the slab layer adjacent to the weak layer must be retained to deliver energy to the crack tip.

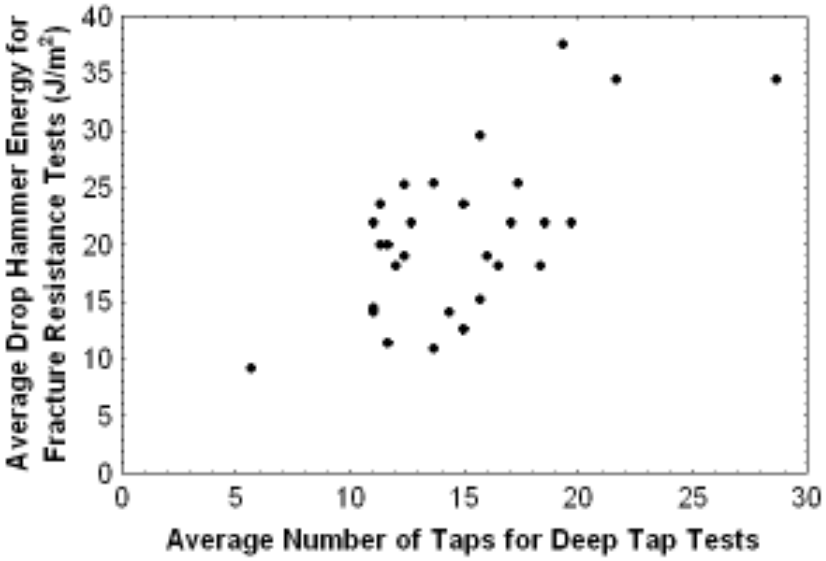


Figure 1 – Scatterplot of average drop hammer energy from fracture resistance tests versus average number of taps from adjacent deep tap tests on the same layer.

Figure 1 is scatterplot of deep tap tests and fracture resistance tests performed in our study plots. Drop Hammer Energy (DHE) on the vertical axis can be thought of as a conversion factor that enables us to compare fracture resistance measurements made with different hammers. It is roughly equal to the drop height (cm) using the 1 kg hammer required to fracture the weak layer across the column. Each point represents one series of tests on a particular weak layer on a particular day. A series of tests consists of three fracture resistance tests and three deep tap tests in close proximity; the average of the three tests is then used for the comparison. The scatterplot shows a significant positive linear correlation (Pearson R=0.65, $p<10^{-3}$, N=29) suggesting that the two loading methods measure similar properties; however, most of the data to date lies in the 'moderate' range. Next winter we hope to get more data in the 'easy' and 'hard' ranges.

Figure 2 displays the results of two groups of fracture resistance tests performed in a gully, showing slope-scale effects of aspect on fracture resistance. Each shaded square represents a test column with the drop height (cm) for the 1 kg hammer shown in the square. On the west-southwest aspect of the gully, we observed smaller surface hoar crystals and higher average drop heights (fracture resistance) than on the northwest aspect. It is probable that the smaller surface hoar crystals on the west-southwest aspect are the result of radiation and wind effects while the surface hoar was on the surface.

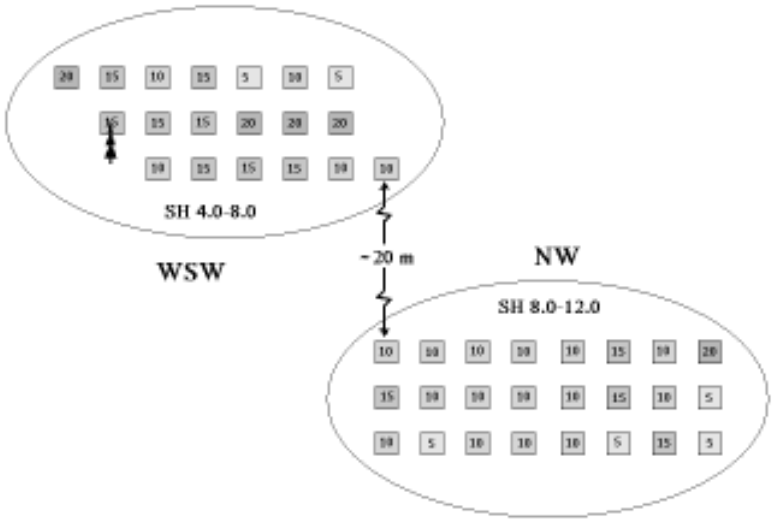


Figure 2 – Fracture resistance test array performed on 030117in NRC Gully at Rogers Pass on the 021225 SH layer with the 1 kg hammer.

cont.

Figure 3 shows the correlation between drop hammer energy (fracture resistance) and week layer thickness for surface hoar layers. This data set comes from a combination of all the fracture resistance arrays performed and each point represents a single test. A strong negative correlation can be seen (Spearman rank R = -0.47, $p < 10^{-3}$, N=400). It is apparent that for tested surface hoar layers over 0.5 cm thick fracture resistance is rarely over 60 J/m^2 and for layers over 1.0 cm thick, fracture resistance is rarely over 40 J/m^2. This suggests that thicker surface hoar layers offer less resistance to fracture than thinner layers.

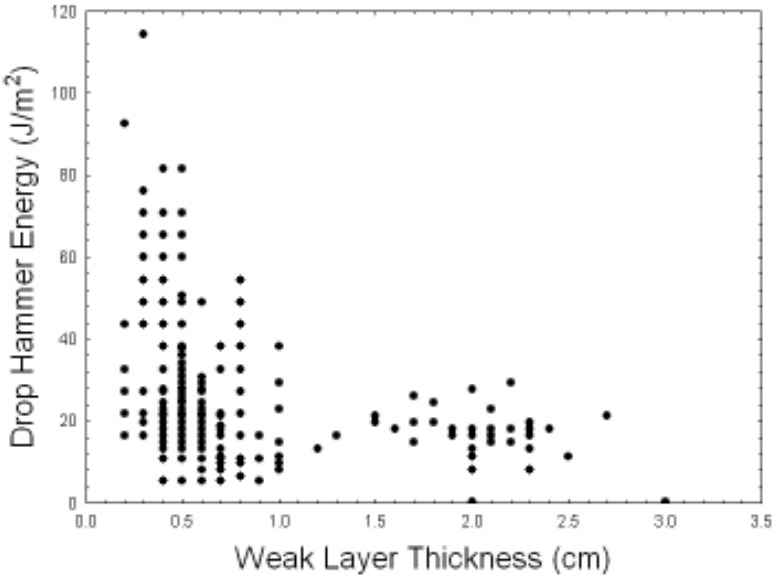


Figure 3 – Scatterplot of Drop Hammer Energy from fracture resistance tests versus weak layer thickness.

Figure 4 is an array of tests that shows the effects of microscale weather phenomena and microscale terrain features on rutschblock scores. A depression in the snow surface can be seen just right of the center of the array. This corresponded with an area of lower rutschblock scores where the surface hoar layer was found to be very well preserved. The group of higher scores near the hiker's left side of the array was on higher ground where the layer was found to be mostly destroyed. This slope was undisturbed by skiers or avalanches so the high scores may be due to wind when the surface hoar was on the surface. The low scores on the far left side and the high scores on the right side again correspond with low and high ground, respectively.

A pilot study at Rogers Pass during the winter of 2003 showed that the interquartile coefficient of variation for the drop hammer fracture resistance test averaged 16% within 17 slope arrays whereas the same measure of variability for stability tests for similar slope arrays averaged 33% (Stewart, 2002, p. 41-42). Also, all tests in 13 of 17 arrays exhibited "sudden planar" fractures (van Herwijnen and Jamieson, in press). These early results support the hypotheses of Ron Johnson and Karl Birkeland (2002) that shear quality (fracture character) is related to fracture propensity and should be less variable within slopes than stability test results.

Other results from last winter include: increased variability with array median for arrays of fracture resistance tests and for arrays of rutschblock tests. Also, four fracture resistance arrays showed significant positive correlations with weak layer depth, so typically, deeper weak layers offered more fracture resistance.

For next winter the plan is to perform more arrays hopefully on weak layers other than surface hoar. We plan to analyse the effect of the notched column in our study plots by performing fracture resistance tests next to tests with smaller un-notched columns. We also hope to take more photographs of our array sites in order to produce more images like the one shown in Figure 4. As mentioned above, we plan on improving our comparison of the two loading methods for the fracture resistance tests with more data in the 'easy' and 'hard' ranges.

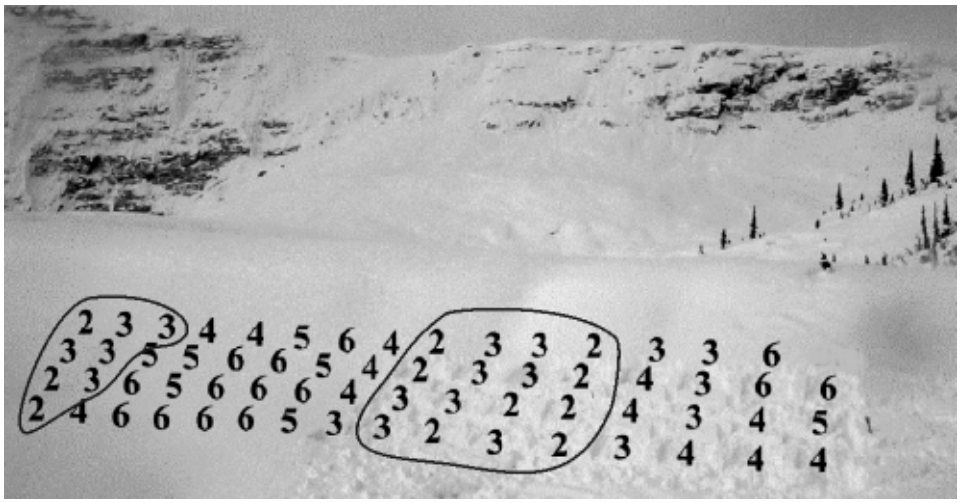


Figure 4 – Rutschblock test array performed at Mount Abbott on 030227-030228 on the 030215 SH layer. Areas of lower scores are surrounded by lines.

Acknowledgements

We would like to thank Alec van Herwijnen, Antonia Zeidler, Paul Langevin, Ryan Gallagher, Ken Matheson, Ilya Storm, Donna Delparte, and all of the Rogers Pass Avalanche Control Section for their help in the field. We would also like to acknowledge our financial supporters: BC Helicopter and Snowcat Skiing Operators Association, Natural Sciences and Engineering Research Council of Canada, Don Schwartz, Canada West Ski Areas Association, and the Canadian Avalanche Association, as well as organizations providing in-kind support: Mike Wiegele Helicopter Skiing, BC Ministry of Transportation, Canadian Avalanche Association, Kicking Horse Mountain Resort, and Mt. Revelstoke and Glacier National Parks.

References

van Herwijnen, A. and B. Jamieson. 2003. Fracture character in stability tests: Results from 2002-03. *Avalanche News*, volume 66. Canadian Avalanche Association, Revelstoke, BC.

Johnson, R. and K. Birkeland. 2002. Integrating shear quality into stability test results. Proceedings of 2002 International Snow Science Workshop in Penticton, Canada, (J.R Stevens, editor). BC Ministry of Transportation, Victoria, BC, 508-513.

Stewart, K. 2002. *Spatial Variability of Slab Stability within Avalanche Start Zones*. MSc thesis. Dept. of Geology and Geophysics, University of Calgary, Calgary, Alberta.

Stewart, K. and B. Jamieson. 2003. Spatial variability of slab stability in avalanche start zones. Proceedings of 2002 International Snow Science Workshop in Penticton, Canada (J.R Stevens, editor), BC Ministry of Transportation, Victoria, BC, 544-548.

Cam Campbell, author of this paper**,** is currently working on his M.Sc. thesis with Dr. Bruce Jamieson and the Applied Snow & Avalanche Research Group at the University of Calgary. Prior to returning to school to complete his masters, Cam completed his B.Sc. at UBC, in his native city of Vancouver, and worked briefly as an auxiliary field assistant for the B.C. Ministry of Transportation in Pemberton, BC. He has been a ski patroller for eight years and when not conducting research or patrolling, Cam volunteers for SnowSmart, teaches the occasional RAC course, and enjoys telemark skiing, mountain biking, and mountaineering.

An Update on Fracture Character in Stability Tests.

Alec van Herwijnen[1] and Bruce Jamieson[1,2]
[1]Dept. of Civil Engineering, [2]Dept. of Geology and Geophysics, University of Calgary

Rutschblock and Compression tests are stability tests commonly used by avalanche practitioners to evaluate instabilities in the snowpack. Past research (i.e. Föhn 1987, Jamieson 1999) has shown that as the number of taps for the compression test (or the loading step for the rutschblock test) increases, slab avalanching becomes less likely. Indeed, as shown in Figure 1, all skier-tested slopes where the compression test score was in the easy range were triggered, while only 19 out of 51 (37%) slabs released on slopes with an average score in the hard range. Similar numbers are found for the rutschblock test, with a frequency of skier-triggering of 100% for RB1 and 28% for RB6.

An ideal stability test would have a frequency of skier-triggering of 0% for the last loading step. This is clearly not the case for the compression test nor the rutschblock test. Of course we could keep tapping on our shovel until our hands are numb and hope to find a high enough loading step, but this is not practical. Instead, practitioners and researchers have been looking for ways to improve the interpretation of the stability test results by incorporating a qualitative description of the character of the fracture in the weak layer.

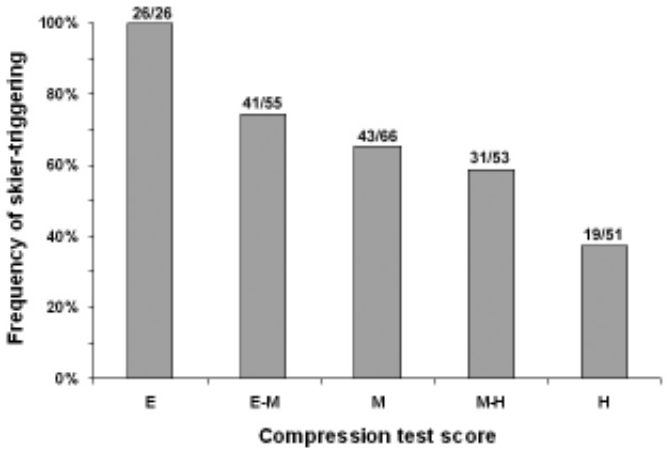


Figure 1: Frequency of skier triggering by average compression test score for 251 skier-tested dry slabs. From 2003 ASARC database, winters 1996-2003, Columbia Mountains, British Columbia, Canada.

Field workers have been distinguishing fractures involving collapse from other fractures for many years now. Since 1981, the Canadian Avalanche Association's Guidelines for Weather, Snowpack and Avalanche Observations (NRCC 1981 & 1989, CAA 1995 & 2002) have assigned a special code (STC) for shovel tests that resulted in noticeable collapsing of a layer and "settlement" of the overlying block when the shovel is inserted. The 1995 and 2002 editions of the guidelines note that sudden failures that result in distinct lines ("pops") are more often associated with avalanches than test results with rough or indistinct fractures. Avalanche professionals are well aware that some types of fracture have to be distinguished from others. This is exactly what the current research is aiming for; a systematic description of fracture character in stability tests to improve the interpretation of the results.

In Switzerland, a rating system for the type of release and quality of the fracture plane in rutschblock tests is used. The type of release is described as whole block, below the skis, or only an edge, and the fracture quality is either clean, partly clean, or rough (Schweizer and Wiesinger 2001). Unfortunately, no data from this descriptive system has been presented thus far.

In North America, two fracture classification systems for stability test results are currently in use. In the United States, Birkeland and Johnson (1999) introduced a three level shear quality description: Q1 is a "clean, fast shear," Q2 is an "average shear," and Q3 is an "irregular or dirty shear." At the 2002 ISSW in Penticton, Johnson and Birkeland summarized six years of shear quality data from stability tests. Comparing the data with somewhat subjective "signs of instability" in the area of the test (southwest Montana and northwest Wyoming) they reported improved interpretation of stability test results, particularly for those tests with high scores. A stability test with a high score and with a clean Q1 shear is more likely to be related to signs of instability than a same test result with an irregular Q3 shear.

In a 1999 article on the compression test, Bruce Jamieson outlined a four level description of fracture character, used by researchers of the University of Calgary and some field workers in Canada: Progressive Compression (PC), Thin Planar (TP), Sudden Collapse (SC), and non-planar Break (B). Five winters of stability test data with the four level description of fracture character were analyzed and presented at the 2002 ISSW in Penticton (van Herwijnen and Jamieson 2002). Over 6000 classified fractures from compression and rutschblock tests showed that the weak layer crystal type plays an important role in the fracture character. Most fractures in weak layers composed of precipitation particles, decomposed fragments, and rounded grains, as well as surface hoar crystals, were thin planar fractures. Weak layers composed of depth hoar, or large well developed facets, are more likely to produce a collapsing fracture.

Unfortunately, no significant difference in fracture character was found between the stability tests performed on slopes that were triggered and slopes that were not. Even for stability tests with high scores, the incorporation of the fracture character did not 2%

seem to improve the interpretation of the stability test result. However, a smaller number of stability tests performed on whumpf sites revealed that sudden collapse was the usual fracture type for this type of slab release.

Table 1: Descriptive classification of fracture character in stability tests.

Fracture Character	Code	Fracture Characteristics	Typical Shear Quality
Progressive Compression	PC	Fracture usually crosses column with single loading step, followed by gradual compression of the layer with subsequent loading steps.	Q2
Resistant Planar	RP	Fracture requires more than one loading step to cross column and/or the block does not slide easily on the weak layer.	Q2
Sudden Planar	SP	Fracture suddenly crosses column in one loading step and the block slides easily on the weak layer.	Q1
Non-planar Break	B	Irregular fracture	Q3
Sudden Collapse	SC	Fracture crosses column with single loading step and is associated with noticeable vertical displacement.	Q1
No Failure	NF		

In the fall of 2002 we decided to refine the fracture characterization system. Of all the classified fractures of the previous five years, 55% were characterized as Thin Planar. This category was too broad and was divided into two new fracture categories: Sudden Planar (SP) and Resistant Planar (RP) (Table 1). This new fracture classification system was used last winter by field workers of the University of Calgary in Blue River and in Glacier National Park. After one winter, the first results are encouraging.

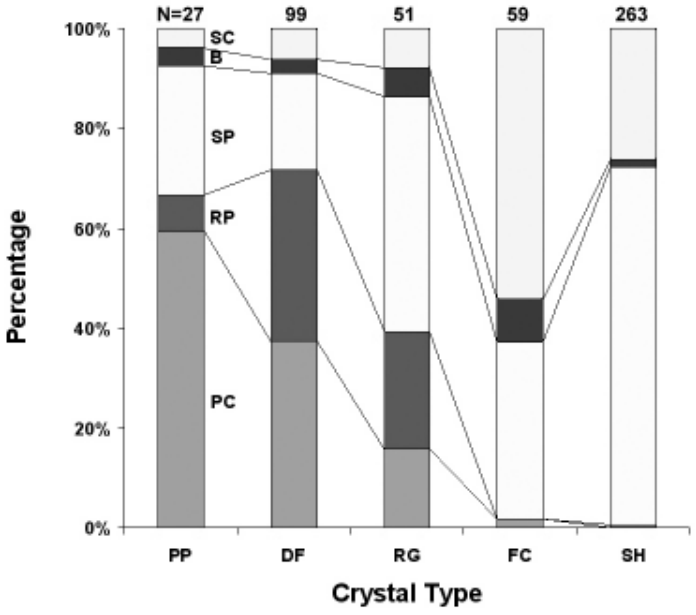


Figure 2: Fracture character from compression tests by grain type for precipitation particles (PP), decomposed fragments (DF), rounded grains (RG), faceted grains (FC) and surface hoar (SH). From 2003 ASARC database, winters 2002-2003, Glacier National Park and Blue River area, British Columbia, Canada.

The weak layer crystal type is again important for fracture character in compression tests, as can be seen in Figure 2. While thin planar fractures dominated the previous data set, the distribution is broader. Weak layers of decomposing fragments and surface hoar crystals used to have the same main fracture character (TP). With the new classification system, failures in weak layers of decomposing fragments usually exhibit PC (37%) and RP (34%). Surface hoar layers on the other hand are mainly associated with SP fractures (72%). Again, layers of faceted grains often fail with a sudden collapse (54%). Sudden fractures (SP and SC) account for 97% of the fractures in persistent weak layers (surface hoar or facets). As shown in Table 1, sudden fractures would likely be classified as Q1 in Birkeland and Johnson's shear quality rating. Progressive compressions are mainly observed in shallow storm snow layers. It is the leading fracture character for layers composed of precipitation particles (59%) and decomposing fragments (37%). Unfortunately, we have insufficient data from Rutschblock tests with the revised scheme.

After only one winter, it is hard to evaluate the validity of the new characterization system, however the results are promising. The new fracture characterization scheme is easy to learn and does not require a lot of experience to obtain consistent results. The limited data we have on skier-tested slopes, including whumpfs, show that the fraction of SP fractures for stability tests performed on slopes that released (16 slopes) is substantially greater than that for stability tests performed on skier-tested slopes that did not release (6 slopes).

In Figure 3 the percentage of compression test results for each fracture character is shown for skier-triggered slopes and for slopes that were skier-tested but not triggered. On skier-triggered slopes, 80% of fractures were characterized as SP, 10% as RP and only

as PC. On skier-tested but not triggered slopes, only 36% of the fractures are now characterized as SP. However, 20% of fractures are now classified as RP and the number of PC fractures has increased from 2 to 29%. Unfortunately the number of tests performed on skier-tested slopes is very limited. Only 23 slopes were skier-tested. Nevertheless, the data seem to indicate that SP fractures are more often associated with avalanching than PC and RP fractures.

The reason for this is probably that fracture character gives a qualitative description of the fracture propagation propensity through the weak layer (Johnson and Birkeland, 2002). PC and RP fractures are usually gradual fractures, meaning that the fracture progresses over several loading steps. On the other hand, SP fractures are fast fractures that happen as a result of one single loading step. This could indicate that fractures propagate more easily through weak layer that produce SP fractures, and therefore these are more likely to be the failure plane for slab avalanches. This is consistent with the Observation Guidelines (CAA, 1995, 2002)

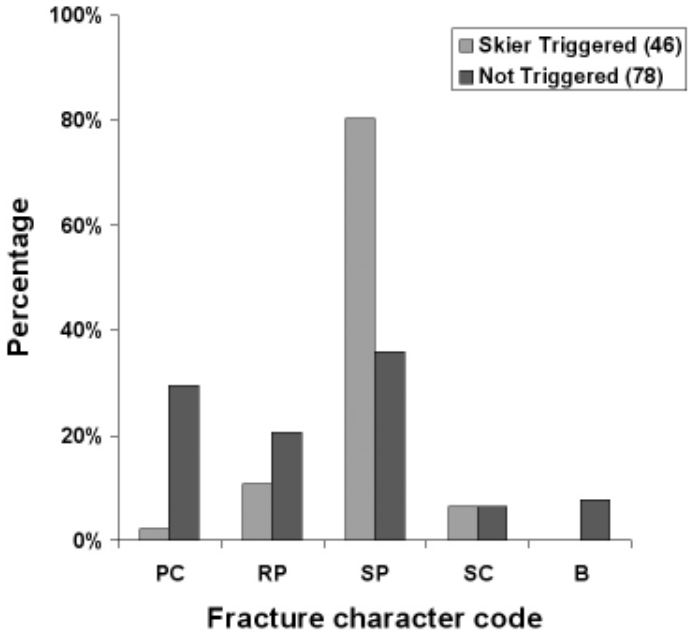


Figure 3: Fracture character in compression tests for skier-tested dry slabs. From 2003 ASARC database, winters 2002-2003, Glacier National Park and Blue River area, British Columbia, Canada.

We will continue to use this fracture characterization next winter, which will hopefully be a more "normal" winter. More data will be collected, and a trend will emerge. The goal is to create a classification system for fractures that is easy to apply and improves the interpretation of stability test results. Essentially we are trying to quantify experience in such a way that information exchange and the transfer of knowledge about snowpack tests is made easier.

References

Birkeland, K.W., R.F. Johnson. 1999. The stuffblock snow stability test: comparability with the rutschblock, usefulness in different snow climates, and repeatability between observers. *Cold Regions Science and Technology*, Vol. 30 (1-3), pp. 115-123.

Canadian Avalanche Association. 1995, revised 2002. *Observation Guidelines and Recording Standards for Weather, Snowpack and Avalanches*. Canadian Avalanche Association, Revelstoke, BC.

Föhn, P.M.B. 1987. The rutschblock as a practical tool for slope stability evaluation. *International Association of Hydrology Science Publication*, 162, pp. 223-228.

van Herwijnen, A.F.G., B. Jamieson. 2002. Interpreting fracture character in stability tests. *Proceedings of the International Snow Science Workshop*, Penticton, B.C.

Jamieson, J.B. 1999. The compression test - after 25 years. *The Avalanche Review*, 18 (1), pp. 10-12.

Johnson, R.F., K.W. Birkeland. 2002. Integrating shear quality into stability test results. *Proceedings of the International Snow Science Workshop*, Penticton, B.C.

Schweizer, J., T. Wiesinger. 2001. Snow profile interpretation for stability evaluation. *Cold Regions Science and Technology*, Vol. 33(2-3), pp. 179-188.

Alec van Herwijnen, author of this paper, is currently working on his PhD thesis with Dr. Bruce Jamieson at the University of Calgary. Coming from a Dutch father and a French mother, Alec grew up in the quiet town of Geel in Belgium. He moved to Utrecht in the Netherlands to study physics in 1995. In 2001 he got his Masters in physics and in meteorology. Looking for something in glaciology, he discovered the avalanche research program at the University of Calgary and successfully applied for a position there. Alec who enjoys playing in the mountains has found that Canada is perfect for that.

Risk Management for the Spatial Variable Snowpack

Bruce Jamieson
Dept. of Civil Engineering, Dept. of Geology and Geophysics
University of Calgary

As part of discussions on spatial variability – including discussions on CAA courses – over the last five or so years, I have asked many people who work with avalanches how they manage the risk. The ideas that follow are a compilation of their replies and some of my thoughts. Some ideas are established and some may be new. Some suggestions may be practical for particular operations but not others.

Figure 1. Slab avalanche on Mt. Lipalian outside the Lake Louise Ski Area. A skier triggered the slab where the snowpack was thin.

Pre-season planning

- Hire experienced people. The more varied conditions they have experienced, the better.
- Identify areas where the ground cover is highly variable, perhaps with summer or fall terrain photos.
- Keep records of areas that have produced unexpected avalanches in the past. Make this information available to new staff, possibly on a map.
- Where practical, for example on a dud search, get winter staff into avalanche terrain when there is no or little snow on the ground so they can observe the ground cover.

Daily planning

- Relate snowpack distribution and stability to terrain (aspect, elevation, feature, etc.) wherever and whenever possible, verbally, in writing, graphically, and/or on maps.
- Since spatial variations of stability are greater when the snowpack is shallower, interpret snow/weather history in terms of high or low snowpack variability. Relate the current snowpack to previous winters.
- Attempt to identify spatial patterns locally and regionally using the results of skiing, probing, field tests, avalanche observations, and information from other operations.
- Emphasize field time. Have guiding/forecasting staff moving in avalanche terrain — feeling, probing, digging, skiing, etc.
- Use a wider margin of safety when variability is high, e.g. early winter, thin snowpack winter, complex mid-winter snowpack.
- Watch for change in snow distribution as winter progresses.
- When and where the snowpack is especially variable, interpret the results of individual snowpack tests and profiles with reduced confidence.
- Make a plan for focused (but limited) field observations. This plan can arise from knowledge gaps identified during the forecasting process (e.g. checklist).
- Make time to analyze the observations and information from other operations.

Travel and field work

- Ski a lot, probe a lot, test the snowpack. Discuss what you find. Attempt to identify spatial patterns in stability, then verify the suspected patterns where and when practical. Observe profiles and tests where snowpack properties appear average. Supplement these with profiles and tests where snowpack is not average. Some areas of thinner than average snowpack exhibit below average stability.
- Use a wider margin of safety ***when*** variability is high, e.g. early winter, thin snowpack winter, complex mid-winter snowpack.
- Use a wider margin of safety ***where*** variability is high, e.g. cross-loaded slopes, boulder field, moraine, buried crusts – recognizing that the stability of late season crusts can vary with subtle aspect changes.
- Where variability is high and risk is low (e.g. boulder field on non-avalanche slope), observe the variability by skiing and probing.
- Where variability is high and risk is high (e.g. boulder field at toe of avalanche slope), avoid the slope or use explosives if practical.
- Manage the group or team to minimize triggering from less stable areas, e.g. areas of thin snowpack, or areas of high variability.

- Explosive testing, try a variety of placements: air, over rocks, thick areas, toe of slope, etc.
- Be aware that even subtle spatial variations in snowpack properties can have important effects on stability.
- Stop and visualize snow distribution from a safe place such as the top of a run.
- Use a digital camera to photograph avalanches, unexpected snow distribution, etc., for discussion with other employees.
- Avoid known problem areas
- Make time to analyze the observations.
- Communicate unexpected observations with others who work in the area.

Most profiles and snowpack tests are indicative of average snowpack properties, but the usually elusive areas of minimum stability are important for decision-making. An understanding of the variability will help estimation of minimum stability from indications of average stability.

Uncertainty

Chris Stethem summed up one of these discussions with "greater uncertainty requires a greater margin of safety." Recalling the avalanche triangle with sides for Snowpack - Terrain - People, it's worth noting that there is uncertainty associated with all three sides of the triangle. During poor visibility or when we are off known routes, terrain contributes to uncertainty. However, because terrain does not change over time, people and the snowpack are greater sources of uncertainty in most situations. Some guides have emphasized this by saying that "the snowpack is the problem, and terrain is the solution." In unusual snowpack conditions, though, past experience in the terrain should be applied with caution. The attention to human factors in modern avalanche courses can be viewed as a response to the uncertainty due to people. However, the snowpack – and associated weather – is a major source of uncertainty. I hope these preliminary lists include some helpful risk management strategies for the spatially variably snowpack.

Thanks to the many people who shared their ideas on this topic. In particular, Chris Stethem, Clair Israelson, Jeff Boyd, Ian Campbell, and John Tweedy contributed valuable strategies.

ATTENTION RAC INSTRUCTORS

YOUR STUDENTS ARE APPLYING FOR CAATS COURSES

One of the prerequisites for the CAA Training School's Snowmobile or Ski Operations Level 1 course is participation on a RAC course. Applicants must submit a photocopy of their RAC certificate, or proof of attendance on a RAC course, as part of their application package. Talking to our students it has become clear to us that many RAC students don't get anything from their RAC provider as proof of attendance on courses.

Standardized RAC certificates are available through the CAA for current RAC providers free of charge. Contact Audrey at audrey@avalanche.ca for more information.

For those that do issue certificates could you please let your participants know that they will require it if they intend to go on to the Level 1 Ski Operations program.

Thanks very much,

Ian Tomm
Schools Coordinator

canadianavalancheassociation

CAA Milestone: First Snowmobile Guide to Become CAA Professional Member

BY TODD BEERNINK

On April 23 the CAA welcomed Paul Fossberg as the first full-time snowmobile guide to become a Professional Member.

Fossberg, a guide with the snowmobile touring company Toby Creek Adventures of Invermere, BC, began his avalanche training in 1996 while working as a ski patroller and junior member of the snow safety team at nearby Panorama resort. "Without the help of Panorama and Toby Creek Adventures I wouldn't be where I am today."

Paul began snowmobiling five years ago and started helping out with snowmobile touring operations at Toby Creek two years later. "The more I worked with Toby Creek, the more I appreciated being on the leading edge of something. Mountain riding is an interesting niche and it's growing — it's exciting to be involved in that growth."

Avalanche awareness amoung sledders is something that Paul strongly encourages, especially for those who ride with their kids. "Kids learn by example and when they go out there with their parents, it's important that they show respect for the terrain. First parents have to understand what 'respect' really means."

"I don't want to sound like a nag," Fossberg says quietly, "but even after all the accidents we had in Canada last winter, I still met people out there riding without avalanche gear or the skills to use it." Working in or near avalanche terrain six out of seven days per week, he has a humble respect for the mountains and encourages everyone to take a weekend avalanche course from a member of the CAA.

With a goal of increasing sledder enrollment in professional level avalanche courses, Fossberg will be helping the CAA overhaul the Snowmobile Operations course this fall with industry stakeholders such as the BC Snowmobile Federation and the Alberta Snowmobile Association.

Congratulations, Paul, on becoming the first of what we hope to be a growing number of snowmobilers to become professional members.

Overhaul of Avalanche Training Program for Snowmobilers in the Works

BY IAN TOMM

This past spring the BC Snowmobile Federation (BCSF) initiated a project to take a look at the CAA's training program for snowmobilers. Together, we are trying to address some of the issues surrounding the continued decrease in enrollment, and subsequent cancellations, in the week-long Snowmobile Operations course, the only professional level avalanche program for snowmobile touring operations and trip leaders in Canada (it is the equivalent of the Level 1 Ski Operations course).

Throughout the summer the CAA, representatives from the BCSF, the Alberta Snowmobile Association (ASA), and a few other stakeholders have been reviewing the curriculum, manual, and teaching materials of the week-long training program in preparation for the Snowmobile Curriculum Workshop being held in Revelstoke this September. While the attendees for the workshop have already been finalized, anyone interested in sharing their thoughts on professional avalanche training for the snowmobiling industry is encouraged to contact the BCSF or the CAA directly (c/o Ian Tomm: 250-837-2435 or ian@avalanche.ca).

We anticipate some key new developments as a result of this collaborative effort and we hope to have a new and improved Snowmobile course ready for a Beta test by early season, location to be announced shortly. Industry stakeholders who wish to be a part of this course are encouraged to contact Ian Tomm, the Schools Coordinator, to express their interest in attending.

Canadian Public Safety Personnel Participate in Technology Transfer Trip

BY EVAN MANNERS

Seven Canadians from various aspects of our Public Avalanche Safety industry traveled to France during June of 2003 in search of knowledge that could be transferable to Canada. Since the terrorist attacks on the US World Trade Centre, the entire North American explosives industry has come under increased control and scrutiny. Here in Canada, the Explosives Act has regulated changes that affect virtually every explosives user in the avalanche industry. Although these changes have been embraced as for the common good, they also significantly change the cost/benefit balance between traditional explosives-based avalanche initiation and fixed installations designed to initiate avalanches without the use of explosives.

The technology transfer visit to France was organized by the Canadian company Mountain Management which manufactures and distributes the AvalHex system for initiating avalanches using a hydrogen/air mixture. This system was primarily developed in France by the government-funded research institute CEMAGREF. Once the technology was developed and proven, a French company and Canada's Mountain Management continued commercial development until the AvalHex system started to replace older systems in Europe in recent winters. The AvalHex system will also be manufactured in Canada in the near future, and various installations are already in the planning stages around North America.

The author, who was a member of the group of Canadians that traveled to France, had the opportunity to not only meet the owners of both the French and Canadian companies manufacturing the Avalhex, but also some of the CEMAGREF researchers who developed the underlying technology. This, coupled with the opportunity to observe a series of test blasts at a research installation in the famous Col De Galibier, allowed a much better understanding of how the system actually functioned and when an AvalHex installation made economic sense.

Following the demonstration, the team of Canadian observers took a helicopter flight in the heart of the French Alps to a series of installations designed to mitigate a multi-faceted avalanche control problem. This area involved a National Park where explosives were banned, a very large resort with a multitude of ski lifts over some wild terrain and a serious highway avalanche hazard, all packed into an area of only a few square kilometers. During the flight, the French team that manages the area pointed out AvalHex installations in broad gentle start zones as well as some incredibly steep terrain where the pole-mounted AvalHex system seemed to be the only option other than weather dependent heli bombing. As a wrap up to the visit, the built in safety systems of the AvalHex were demonstrated in a working environment on equipment that had been used for several years under tough weather and terrain conditions.

During the trip, some interesting examples of both old and new splitter wedge building designs were seen in low and moderate hazard avalanche runout zones. Various other non-explosive mitigation measures, such as metal snow containment bridges in start zones, wire rope containment nets in both start zones, and areas subject to a combination of rockfall/avalanche hazards, were also seen all over the French Alps during the team's travels. In the steep Col de Galibier area where the world famous Tour de France tests even the world's elite bicycle racers, some interesting wind driven snow deflection structures were also seen high in the pass. Throughout the whole trip, the French were helpful and accommodating hosts. Mountain Management, organizers of the trip, must be complimented on their excellent planning effort, which combined an action-packed opportunity for public safety systems in France to be seen by Canadians responsible for similar problem terrain at home with an opportunity to enjoy all that the mountain culture of France has to offer.

Trip participants included Mountain Management president Peter Perreault, and CAA professional members Marc Ledwidge, Tony Moore, Mike Gajda, Alan Jones, Evan Manners, Bernie Protsch, and Bruce McMahon.

Analysis of Avalanche Safety Equipment for Backcountry Skiers

Translation of a paper from JAHRBUCH 2002
Published by the Austrian Association for Alpine and High Altitude Medicine

Authors: Hermann Brugger[1], Markus Falk[2]

[1]Hermann Brugger, MD. (University of Vienna, Austria), emergency and mountain rescue doctor for the South Tyrolean Mountain Rescue Service. He is Chair of the Mountain Medicine Committee – International Commission for Mountain Rescue (ICAR), and lives in Brunneck, South Tyrol, Italy.

[2]Markus Falk has a Masters degree in mathematics and information technology. He lives in the Italian South Tyrol.

Translation: Initial translation provided by Manuel Genswein; additional grammatical wordsmithing by CAA reviewers.

Abstract

This review aims to evaluate and compare avalanche safety equipment for downhill and off-piste skiers on the basis of published rescue data. A new classification for avalanche rescue devices is proposed. With respect to the different mechanisms of action we distinguish the following categories rescue devices:

A) devices aiming to prevent or reduce the extent of burial (ABS Avalanche Airbag, Avagear);
B) devices aiming to shorten the duration of burial (avalanche beacon, K2 avalanche ball); and,
C) devices with the aim to prolong survival time during complete burial (AvaLung TM).

The reduction of mortality is essential for the assessment of efficiency, representing the main criterion for the evaluation. The ABS Avalanche Airbag lowers mortality significantly from 23.0% to 2.5% (p=0.001) and is considered as acceptable, safe, and useful (Class IIa, the safety equipment of choice). Avalanche beacons are marginally effective at reducing fatalities, (p=0.054) (Class IIb, acceptable and useful devices). Due to the lack of data, AvaLung, Avagear and the K2 Avalanche Ball are determined to be "Class III, indeterminate efficacy," as additional confirmation is needed.

Keywords: Avalanche, classification, mortality, rescue device, safety equipment

Introduction

In the last few years the options for safety equipment for the ski tourer and off-piste skier have been expanded by a few interesting possibilities. Although there is already a retrospective evaluation for the efficiency of avalanche rescue transceiver[(1)], there have not been any evaluations for the efficiency of the newer types of equipment. In this overview, we will analytically compare and classify the available safety equipment based on previously published data. Only those pieces of safety equipment which are either available on the market or in the stage of final testing are included in this comparison. Search devices suitable only for organized rescue teams (e.g., RECCO) were not included.

Pathogen factors of an avalanche burial

The survival chances for persons caught in avalanches are dependant on several factors. Apart from the fact that a person carried by an avalanche can suffer fatal injuries from mechanical snow pressure, collision with obstacles in the avalanche path, or falls over cliffs in the avalanche path, survival chances after the avalanche comes to a stop depends on whether the victim is able to breathe, and in case of critical burial (head and the upper part of the body in the snow) how fast the victim is dug out. If the airway of the buried person is not clear and if there is no air pocket around the victim, after 35 minutes the victim's fate is hopeless and any help will be too late[(2)]. However, with a clear airway and an air pocket, it is possible to survive longer. Survival of totally buried persons is also influenced by hypothermia and other, up to now unknown, co-factors[(3)]. Data shows approximately 75% of avalanche fatalities are due to asphyxia, 15 to 20% due to deadly trauma, and 5 to 10% due to hypothermia and other factors.

Effect of safety equipment

The most deadly risk during avalanche burial is the danger of acute asphyxia. The purpose of avalanche safety equipment is to prevent suffocation of the buried person. This purpose can be achieved by three different mechanisms, each with different working principles and efficiencies. The different approaches will be discussed in detail.

A. Reduction of the degree of burial

The most efficient means of preventing avalanche fatalities is to avoid complete burial. Of 1886 persons caught in avalanches in Switzerland between 1981 and 1998, 735 persons (39%) were fully buried, and 1151 (61%) were partly buried or stayed completely unburied on the surface. 433 persons (23%) did not survive the avalanche. For the completely buried persons, the mortality rate was 52%. For partly buried victims the mortality rate was only 4.2% (p >0.001, Table 1)[(3)]. Measures which help to prevent complete burials reduce mortality. The ABS Avalanche Balloon System and the Avagear life vest provide floatation which keeps the

victim on the surface while the avalanche is in motion. Swimming motions by the victim while the avalanche is in motion can be life saving if it is possible to stay on the surface[4].

Table 1: Analysis of all persons caught by avalanches in Switzerland between 1981 and 1998 showing location of burial (A) and the degree of burial (B). The difference of the frequencies between (A) and (B) is highly significant (p > 0.001, Pearson's Chi-Square). Modified according to [3].

	Total number of burials	Location of burial (A)		Degree of burial (B)	
		open terrain	buildings, roads, railways	completely buried	not or partly buried
Survived	1453 77%	1053 73.4%	400 88.5%	350 47.6%	1103 95.8%
Dead	433 23%	381 26.6%	52 11.5%	385 52.4%	48 4.2%
Total	1886 100%	1434 100%	452 100%	735 100%	1151 100%

B. Reduction of burial time

Chance of survival over time in a complete avalanche burial is not linear. (See Figure 1). In a complete burial situation, there are phases where the survival rate drops very rapidly – a high risk to die in the first 18 to 35 minutes of burial (asphyxia phase) – and phases with an almost stable survival rate – a greatly reduced risk to die between 35 and 90 minutes of burial (the latency phase)[5]. In principle, by reducing the burial time, mortality can be reduced. However, the efficiency of this strategy depends on which phase of the survival curve is affected. Safety equipment is especially efficient when the steep parts of the survival curve are affected. Transceivers and the K2 Avalanche Ball are examples of safety equipment that reduces burial time.

C. Prolonging survival time during complete burial

The survival chance of a fully buried victim also depends on the existence of free airway and an air pocket in front of the face when the avalanche comes to a standstill[2]. If the victim is able to keep the airway free and have an air pocket, survival time can be prolonged. This means more time available for the rescue of the victim, and this increases the survival chances. The rescue vest AvaLungTM[6-8] is a device which creates an artificial air pocket .

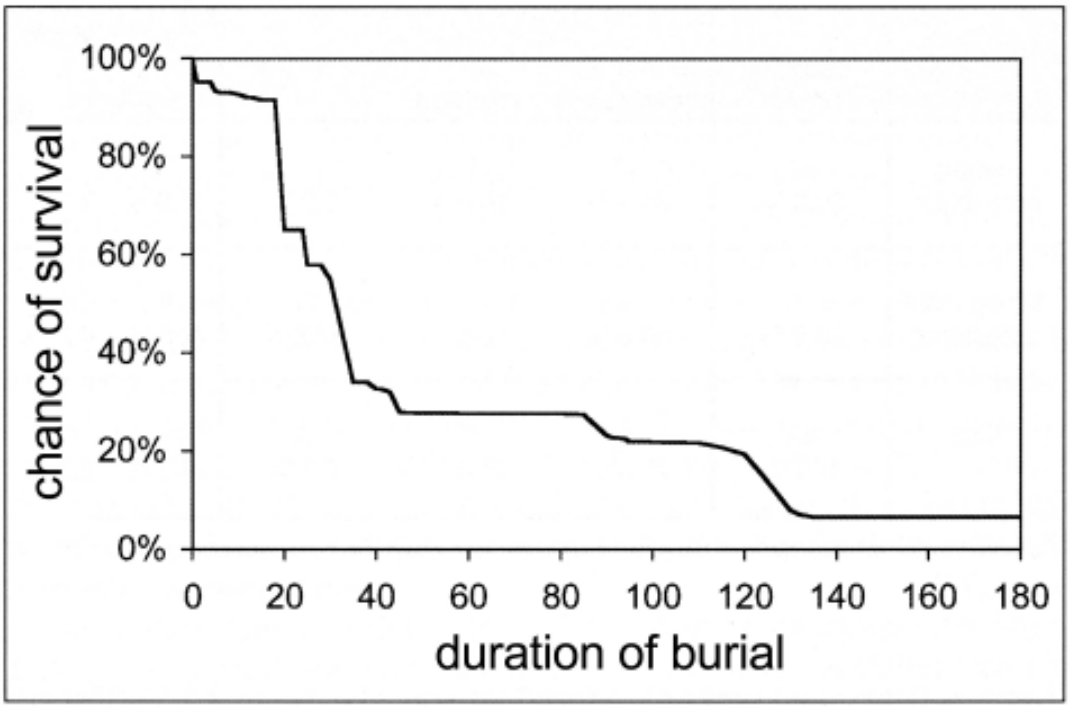


Figure 1: Chance of survival for persons who have been caught and completely buried in an avalanche in open terrain (Switzerland 1981-1998, n=735) as a function of burial time in minutes. Reducing the degree of burial raises the chance of survival, especially when the steep sections of the survival curve are included. Modified according to [3].

Avalanche safety equipment

Depending on the function of the avalanche safety equipment, it can be categorized into one of three different classes. Type A minimizes the degree of burial, Type B the burial duration and Type C extends the time a fully buried avalanche victim can survive within the avalanche. The Types B and C assume a full burial situation and therefore, in order to be efficient, must always be combined with a tool like a shovel which helps to uncover the victim.

Type A: Safety equipment which minimizes the extent of burial

The ABS Avalanche Balloon System[9] is the only commercially available avalanche safety device designed to reduce the extent of burial. It consists of one or two balloons which are integrated into a special back pack. Pulling the emergency handle inflates the balloons with 150 litres of a nitrogen / air mixture within 2 to 3 seconds. Buoyancy due mainly to the effects of the inverse segregation[10, 11] causes the person caught in the avalanche to be held on the snow surface.

All of the known accidents where persons have been caught by avalanches and used the ABS system (N=40) have been documented by the Swiss Institute for Snow and Avalanche Research[12]. Thirty-nine persons (97.5%) using the ABS system survived the avalanche and one person (2.5%) did not (Table 2). In eight cases (20%), the balloon was not inflated because the release handle was not pulled or the inflation system did not function properly. Five persons (16%) were fully buried even though their balloon was inflated. Despite this failure rate, the ABS avalanche balloon reduces the likelihood of complete burial from 39% to 16.2% (Fisher's Exact Test, p=0.006) and lowers the mortality rate from 23% to 2.5% (Fisher's Exact Test, p=0.001). Since the study data was collected, the mechanical triggering mechanism has been replaced by a pyro-electric system and the single balloon system has been replaced with a double balloon design. Those modifications to the ABS have increased reliability. Even though the efficacy of the system is very high, in Europe the ABS system has not been accepted by the backcountry skiers and off-piste skiers in the expected way.

Table 2: Documented avalanche accidents with ABS Avalanche Airbag. Modified according to[12].

	Total number of burials	Degree of burial			Condition when recovered	
		not or partly buried	completely buried	unknown	alive	dead
Airbag inflated	32 80%	27 84.4%	5 15.6%	0 0%	31 96.9%	1 3.1%
Airbag not inflated	8 20%	4 50%	1 12.5%	3 37.5%	8 100%	48 4.2%
Total	40 100%	31 77.5%	6 15%	3 7.5%	39 97.5%	1 2.5%

The Avagear rescue jacket is being developed in the United States and is in its trial phase[11]. In contrast to the ABS balloons contained in a backpack, the Avagear balloons are contained in the collar or shoulders of a jacket or vest, and inflate around the neck and the shoulders of the victim. With this design the head of the victim should stay above the snow surface more often, and the balloon protects the victim's head and cervical spine during the flow of the avalanche. In addition, one hopes that with this system it is more likely to have an air pocket around the head and face of the victim if a full burial does occur. During the three tests which were made up to now, the victim's face remained free. Avagear seems to offer a further development of the avalanche airbag principle which makes sense.

Type B: Safety equipment which reduces the burial time

The avalanche rescue transceiver was developed in 1968 by John Lawton (USA) and is currently the most efficient device to reduce burial duration. A retrospective analysis of 328 fully buried avalanche victims has shown a highly significant decrease of the median burial duration from 120 min to 35 min ($p<0.001$)[1]. The mortality rate was reduced from 75.9% to 66.2% (p=0.054). Reduction of the mortality rate is not as significant as the reduction of the burial duration. This is due to the fact that the reduction of the median burial time mainly affects the part of the survival curve which is relatively flat, and does not significantly affect the part of the survival curve between 18 and 35 min after the avalanche occurred where the survival rate is rapidly decreasing. (See Figure 1). Since newer avalanche rescue transceivers use digital technology with a useful direction indicator, it is anticipated that the survival data for this new generation of transceivers will be better. However, there is no data available yet which proves that conclusion.

Based on one survey, the percentage of European ski and snowboard tourers who are equipped with avalanche rescue transceivers has increased from 29 % in the period 1970-1979 to 74% in the period 1990-1999 (p=0.039)[4]. Today the avalanche rescue transceiver is the most generally accepted type of avalanche safety equipment used by backcountry ski tourers and off-piste skiers.

The K2 Avalanche Ball is a further development of the avalanche cord, an old concept which is out of date. After pulling the trigger handle, the spring-loaded Avalanche Ball pops out of a small pocket on a backpack and opens itself. The low density ball stays attached to the person by a cord, and floats on the surface of the avalanche. When the avalanche stops, companions must visually locate the ball and then follow the cord leading to the buried person. The presumption is that prompt location of the victim should lead to faster recovery, reducing the duration of burial. Up to now several successful tests have been conducted, but no "real life" uses of this device have been documented[11].

Type C: Safety equipment which prolongs the survival time for a fully buried avalanche victim

The AvaLung (TM) survival jacket was patented by MD Thomas Crowley and developed by Black Diamond Equipment Ltd. in Salt Lake City, Utah, USA[13]. The AvaLung is a sleeveless synthetic jacket which is worn when travelling in the backcountry. In an avalanche the victim needs to get the mouthpiece (which comes out of the collar) in his mouth and keep it there during the flow of the avalanche. A valve separates the inhaled air from the exhaled air. During inhalation, the air is extracted from the avalanche snow through a special textile filter on the front side of the victim; during exhalation, the air is directed and vented to the back side of the victim. Due to the separation of the exhaled air, the re-inhalation of CO^2 is prevented. The latest version of the AvaLung system is integrated into a lightweight chest harness.

The goal of the AvaLung system is to prolong survival time in a full burial situation by at least one hour[6-8]. The AvaLung concept assumes a full burial situation, therefore a transceiver and a shovel must always be carried as well. To be successfully rescued, the victim depends on third party help. The efficiency of this safety equipment has been proven in 33 experimental tests where the human test subjects were buried at a 1m depth. There are three documented cases where the AvaLung was used in real avalanche situations. The question of whether or not the mouthpiece can be properly positioned and kept in the victim's mouth through the turbulence of the avalanche cannot be conclusively answered yet[14]. Compared to the ABS avalanche airbag system, the AvaLung has the advantage of lighter weight and lower price.

Valuation and classification of the safety equipment

The statistical proof of a significant decrease of mortality is the most important criteria for valuation of avalanche safety equipment. User friendliness and acceptance are additional criteria that can indirectly influence the efficiency and mortality, but were not taken into account in this study. The analysis of the present data allows one to assign an evidence level (Table 3) to the safety equipment, following the international guidelines 2000 for cardiopulmonary reanimation[15].

Table 3: Safety equipment and their mechanisms of action. The safety equipment is classified after its evidence level. The classification was made according to the international guidelines for cardio-pulmonal reanimation 2000[15].

Mechanism of action	Safety equipment	Classification
reducing the degree of burial	ABS Avalanche Airbag level - acceptable and wise to use it Avagear	IIa good to very good evidence Indeterminate
reducing the duration of burial	Avalanche rescue transceiver level - acceptable and wise to use it K2 Avalanche Ball	IIb medium to good evidence Indeterminate
prolonging the time of survival within the avalanche	AvaLung TM	Indeterminate

A. The ABS avalanche balloon system highly significantly reduces mortality. The class IIa can be assigned to it, which means a good to very good evidence level – acceptable and wise to use it – the safety equipment of choice. The further development of the balloon system leading to a jacket like system which produces an air space around the face as well as a higher reliability rate in the triggering of the system could make the efficiency even higher.

B. The efficiency of the avalanche rescue transceiver is documented in several studies and they show a marginally significant reduction of mortality. The device is only efficient in connection with a shovel. The class IIb means medium to good evidence – acceptable and wise to use it. It has to be noted that the analysis of the efficiency is based on data of the years 1981-1994. It is possible that a new analysis based on current data shows a better significance.

C. AvaLung, Avagear and the K2 Avalanche Ball are all in the class III category "indeterminate," which means that the evidence level cannot be determined due to the lack of data.

Conclusions

There is sufficient data to determine the evidence level for two categories of avalanche safety equipment. As expected, there is no avalanche safety equipment which meets the class I criteria. Class I classification could only be proven through controlled studies, and it would not be reasonable to intentionally put live persons into harmful avalanches.

This analysis was possible thanks to the precisely collected data of Frank Tschirky and other employees of the Swiss Institute for Snow and Avalanche Research. Frank Tschirky died of a heart attack in spring of 2001 on a trekking tour in Nepal – we lost one of the best avalanche experts.

Reliable analysis of avalanche safety equipment in the future will only be possible if the data is collected by an independent institute.

A common characteristic of all avalanche safety equipment is that devices can improve survival chances, but can never completely eliminate the risk of dying in an avalanche.

Risk compensation theory (a propensity to take higher risks because of perceived protection from avalanche safety equipment) suggests human factors could negate some of the technical improvements in avalanche safety equipment. In the backcountry we are only safe when we act in a defensive manner so that we avoid triggering avalanches. Technical devices will never replace this mountaineering skill. Recognition and respect for natural hazards in the mountains will always remain our most reliable partner.

Disclosure

This study has not been financially supported. The authors do not have patent or financial interests on the production or the sales of the described safety equipment.

Literature

(1) Brugger H., Falk M., Buser O., Tschirky F.: Der Einfluss des Lawinenverschütteten-Suchgeräts (LVS) auf die Letalität bei Lawinenverschüttung. Der Notarzt 13, 143-46 (1997)

(2) Falk M., Brugger H., Adler-Kastner L.: Avalanche survival chances. Nature 368, 21 (1994)

(3) Brugger H., Durrer B., Adler-Kastner L., Falk M., Tschirky F.: Field management of avalanche victims. Resuscitation 51, 7-15 (2001)

(4) Brugger H., Flora G., Falk M.: Möglichkeiten der Selbstrettung und posttraumatische Belastungsstörungen beim Lawinenunfall. Der Notarzt 18, 1-4 (2002)

(5) Brugger H., Falk M., Adler-Kastner L.: Der Lawinennotfall. Neue Aspekte zur Pathosphysiologie und Therapie von Lawinenverschütteten. Wien Klin Wochenschr 109. 145-59 (1997)

(6) Radwin M.I., Keyes L., Radwin D.L.: Avalanche air space physiology. Proceedings International Snow Science Workshop 98. Sunriver, Oregon p. 296 (1998)

(7) Crowley T. J.: Avalanche victim's air-form-snow breathing device. Proceedings International Snow Science Workshop 96. The Canadian Avalanche Centre, Revelstoke, BC pp. 306-8 (1996)

(8) Grissom C. K., Radwin M.I., Harmston C. H., Hirshberg E. L., Crowley T. J.: Respiration During Snow Burial Using an Artificial Air Pocket. JAMA 283, 2266-71 (2000)

(9) http://www.abssystem.com

(10) Kern M. A., Vulliet L., Ammann W.: Inverse Grading in granular flocus. Proceedings of NUMOG VII, Graz, Austria (1999)

(11) Kern M., Tschirky F., Schweizer J.: Feldversuche zur Wirksamkeit einiger neuer Lawinenrettungsgeräte. In: Brugger H. et al (Hrsg.), Jahrbuch 2001 Österreichische Gesellschaft für Alpin- und Höhenmedizin, Raggl, Innsbruck, pp. 127-45 (2001)

(12) Tschirky F., Brabec B., Kern M.: Lawinenverschüttetensuchgeräte, Stand der Entwicklungen, Erfolge und Misserfolge. In: Brugger H. er al. (Hrsg.), Jahrbuch 2001 der Österreichische Gesellschaft für Alpin- und Höhenmedizin, Raggl, Innsbruck, pp. 101-25 (2001)

(13) http://www.avalung.com

(14) Brugger H., Wiget U., Durrer B.: Die Lawinenrettungsweste AvaLung von Black Diamond Ltd. Rundbrief der Österreichischen Gesellschaft für Alpin- und Höhenmedizin 21, 22-3 (1999)

(15) Introduction to the International Guidelines 2000 for CRP and ECC, A Consensus on Science. Resuscitation 46, 3-15 (2000)

Rethinking Field Tests: Munter's Reduction Method

BY ANDREW FINDLAY

On an afternoon in January, 2002, five Washington state skiers set off to ski a moderately steep slope near the hut where they had been staying on Mt. Carlyle in BC's Kootenay region.

As they skied single file down the slope, the fourth person triggered a slab release and an enormous Class 3 avalanche, sweeping three members of the party to their deaths.

"They were doing all the right things, as far as testing snow profiles. They were carrying the required gear, the transceivers and the probes and those types of things," a police officer was quoted in a newspaper report describing the incident.

But were they doing everything right?

When we hold a lens to the details surrounding incidents like the Mt. Carlyle avalanche, a pattern usually emerges. Skiers arrive at a point where they must decide whether or not to ski a particular slope. The avalanche hazard is considerable to high. Reports from other skiers in the area help reinforce the forecast. Numerous other signs may have been observed – small naturals, audible settling of the snowpack, visible wind-loading, and cracks splintering the snowpack under the weight of a skier. However a gorgeous, un-tracked, 30º slope beckons and the group has traveled a long way and has spent considerable amounts of money to get there. To put it simply – they want to ski.

They may decide to dig a pit and their route decision hinges on the rutschblock, which might indicate a bomber snowpack.

Then, because of the test results and in spite of obvious warnings to the contrary, they choose to ski the slope. In so doing they have thrown their faith squarely behind the results of a test that dates back 20 years, and has been shown to be a wholly unreliable decision-making tool. If the test results are treated as a representative sample of overall snow conditions, it's a potentially deadly line of reasoning.

Werner Munter, the Swiss mountain guide who gave us the "Munter hitch" knot for climbing, has devoted much thought to how we make decisions in the backcountry, and in particular, the erroneous logic behind using stability tests as a foundation for deciding to ski a certain piece of terrain.

Here's his logic: If we identify a weak layer in a snow pit and base our decisions on this discovery, we are assuming that the snowpack is homogenous: that this weak layer will be found no matter where we dig a pit. Studies have shown, however, that a slab will only release where there's heterogeneity in the snowpack, or as Munter says, a "super weak zone" exists.

Unless we are unlucky enough to locate our snow pit in the exact spot where there is a "super weak zone" – therefore causing the slope to release and sweep us away to certain peril – a snow pit will not help us find the super weak zone.

The unfortunate but nonetheless instructive experience of a group of Swiss Army skiers in 1991 helped to dramatize Munter's ideas. The skiers were performing a rutschblock on a slope in the Alps. They got the best result – that is, no failure after jumping on the block with both skies.

As they lingered to study the snowpack, the slope propagated into a Class 2 avalanche killing two of the skiers. Ironically, the rutschblock was the only section of snow left standing on the slope. By chance they had dug their block on a tiny island of stability. It was a compelling, though tragic, demonstration of what has been called spatial variability in the snowpack.

"Snow profiles measure and observe what's easy to observe but they don't tell you what you want to know – can I or can I not ski this slope?" says Christoph Dietzfelbinger, a German-born guide now working in BC.

He has translated some key parts of Munter's work into English so as to encourage debate and discussion among North American guides and avalanche professionals.

There's a reason we place so much significance on snow profiles; in North America we take pride in our snow science for good reason – we're good at it. Traditionally recreational avalanche courses reinforce the importance of digging snow profiles, by having students diligently analyze the size and type of snow crystals. What they don't adequately address are the severe limitations of snow profiles, rutschblocks, shovel shears, and other spot tests.

Munter wants to change this. He has proposed what he calls the "reduction method," a tool for making the crucial decision about whether or not to ski a slope. And many North American backcountry skiers would be surprised to know that spot stability tests do not factor into Munter's reduction method (see Christoph's article on p.42).

The reduction method is a simplified formula, and though it's designed for the European Alps, it has educational value for North American skiers. The formula divides the danger potential (a number derived from a regional avalanche forecast) by a reduction factor (a number derived from multiplying a number of variables – slope angle, aspect, group size) – that are each given a numerical value. A quotient of less than one is considered an acceptable risk. For a more thorough explanation of the reduction method, see the sidebar.

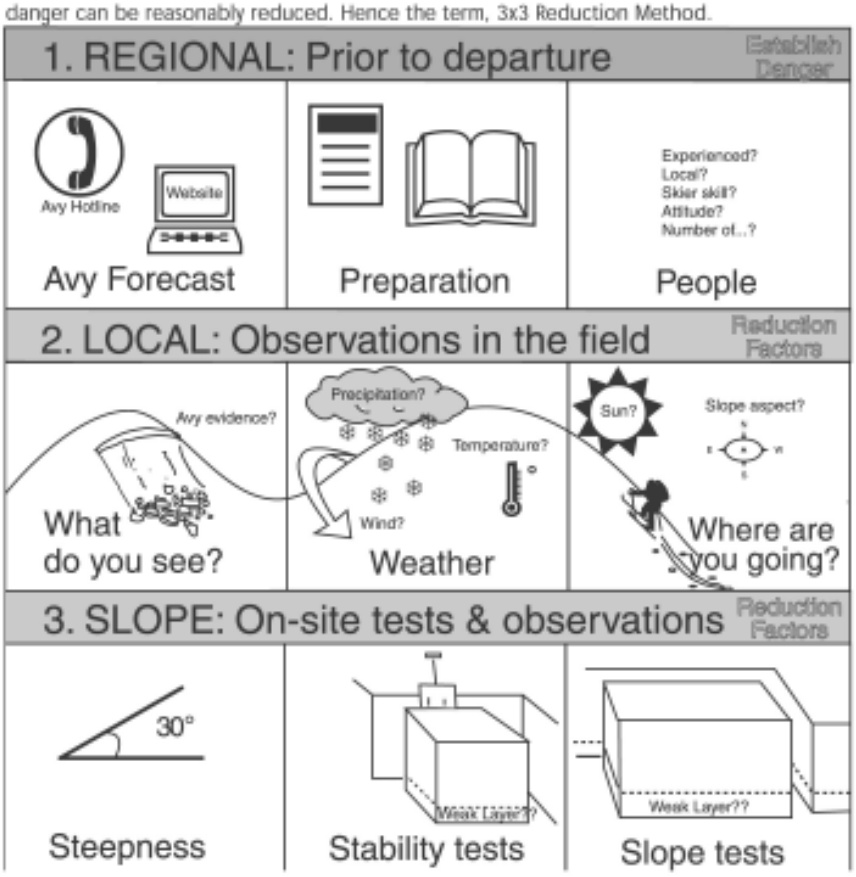
Colin Zacharias teaches courses for the Canadian Avalanche Association. He says Munter's reduction method has helped to simplify avalanche hazard assessment for recreational ski tourers, but that it is not without weaknesses. First of all, as with any model, the reduction method oversimplifies a highly complex environment. For example, it may cause people to focus on punching numbers rather than assessing the nuances of terrain. In particular he believes the reduction method ignores subtleties in terrain, such as whether or not a slope is physically supported details that are especially important in a guiding scenario. Its strength, he says however, is that it minimizes our reliance on nifty stability tests.

Munter has provoked discussion in another are of avalanche hazard assessment, namely the dynamics of decision-making. We like to think that people make rational decisions in the backcountry. They gather data from the field, input these observations into their cerebral cortex, and out pops an objective decision that will keep them safe in the hills. Nothing could be further from the truth. Skiing is an emotionally charged, sometimes euphoric experience, and our decisions are influenced by these emotions. The goals and ambitions of a group of skiers is a powerful motivator. We tend to respect risk takers. We often defer to the most outgoing person in a group regardless of their skills in an avalanche hazard assessment. A slope with a set of tracks on it, or one that is basking beneath a clear, cold sunny sky, appears much less menacing than an untracked slope in white out conditions.

With the advantage of 20/20 hindsight, the tragedy on Mt. Carlyle (in 2002), like most other avalanche accidents, may seem so avoidable. When we read about them we get uncomfortable because we have likely all made similar

Munter's 3x3 Reduction Method

The idea behind Werner Munter's Reduction Method is to take a basic danger level and see if, through at least three observations from three perspectives, Regional, Local, and Slope, the danger can be reasonably reduced. Hence the term, 3x3 Reduction Method.



Danger ÷ Reduction = Risk

Example: $\frac{16}{2 \times 2 \times 2} = 2$

You're in a party of two (you and one other person) in a new area with no visible tracks. The Avalanche forecast is for High danger, and the steepest slope is 38˚ facing approximately North (NNW to NNE).

Avalanche Report: High = 4	Danger Potential = 16
Steepest Slope= 38˚	RF = 2
Slope is in Northern Section	RF = 2
Small group size: 2-4 people	RF = 2

Risk	
>1	**Stop** Risk is too high
=1	**Maybe** Questionable risk
<1	**Go** Acceptable risk

Danger Level

Avalanche Report	Avy Scale	Danger Potential
Low	1	2
Moderate	2	4
Considerable	3	8
High	4	16
Extreme	5	32

Reduction Factors

First Class	Steepest Slope Angle 35˚-39˚	RF2
	Steepest Slope Angle 30˚-34˚	RF4
Second Class	Northern Sector Slope (NW-N-NE)	RF2
	Northern Half Sector Slope (WNW-N-ESE)	RF3
	Avoiding Named Avalanche Slope Sectors	RF4
Third Class	Constantly skied slope	RF2
	Large groups with distance between each	RF2
	Small group (2-4 persons)	RF2
	Small group with distance between each	RF3

transgressions in the backcountry and gotten away with it.

In this light Werner Munter's ideas are not revolutionary. They only highlight what we have known for years. First, snow stability tests and snow profiles are useful for collecting general date about the snowpack but are dangerous when used as a foundation for decision-making. And second, the emotions and subtle dynamics of a group of skiers must be confronted when deciding whether or not to ski a slope.

Recognizing the above will go a long way in keeping us alive in the backcountry.

Editor's Note: The article above was originally printed in Couloir Magazine in November of 2002. It has been reprinted with the permission of Couloir's Editor, Craig Dostie, under one condition: that we emphasize the fact that Munter's reduction method was developed for European conditions, based on European statistics. According to CAA Member, Christoph Dietzfelbinger, quoted above, the article contains a couple of minor inaccuracies, but should serve to outline the basic concepts of Munter's method. For further discussion of the reduction method, see Dietzfelbinger's article on p. 42. To learn more about this decision-making model from Munter himself, make sure to come to the CAA's public safety seminars in Calgary and Vancouver this December 5th & 6th. Details on these seminars will be posted at www.avalanche.ca in October.

Werner Munter takes care to point out that his 3x3 Reduction Method was developed for European conditions, based on European statistics. He notes that using the reduction method will not eliminate the possibility that a ski touring party may be caught in an avalanche. While he specifically claims that it is not valid for North America, due to a wider range of conditions, we feel it is a worthwhile perspective from which to view the decision of whether or not to ski a particular slope since it provides a methodical framework from which to base your decision. Consider how Werner summarized his method when he told an audience of avalanche experts in November 1999, "better to be inaccurate and correct, than precise and wrong."

Werner Munter, born in 1941, is the Swiss mountain guide who gave us the Munter hitch belay method, the rutschblock, and many years dedicated to mountain safety. He has authored numerous technical reports on the subject of avalanches and has been a technical advisor on snow and avalanche courses for instructors of the Swiss Mountain Club for nearly 30 years. In 1995, he was made an honorary member of the Swiss Mountain Guides' Association. A researcher with the Swiss Federal Institute for Snow & Avalanche Research in Davos, Munter stands as one of the authorities on mountain and avalanche safety issues. He lives in Vernamiege near Sion, in the canton of Valais, Switzerland.

According to a report on the October 2002 meeting of the International Avalanche Rescue Commission (ICAR) prepared by Chris Utzinger, "Werner's book *3x3 Lawinen* is officially recognized and recommended by the International Union of Mountain Guide Associations UIAGM) and the International Union of Alpine Associations (UIAA) and is the basis for the avalanche training programs in all alpine organizations across the Alps. In December, 2002 the third revised edition went into print with a new Golden Rule based on the Reduction Method that delivers quick results without having to calculate."

Further information on Munter's reduction method can be found at www.slf.ch/info/tour0-de.html (German only). Information on his book, which is currently only available in German, can be found at www.rother.de/titpage/2060.htm.

Don't miss Werner Munter's first-hand discussion of his reduction method at the CAA's Public Safety Seminar, in Calgary and Vancouver this December 5th & 6th. Stay tuned to www.avalanche.ca for more details.

Don't Reduce Werner

BY CHRISTOPH DIETZFELBINGER

When discussing Werner Munter's new approach to reducing avalanche deaths, people often concentrate on his reduction method and whether it is appropriate for us.

Be aware that Munter's method is not about replacing the art of looking at the snow and the mountains with a mindless mathematical formula. The reduction method is only one part of his approach, which is very broad and reflects on all aspects of avalanche science, decision-making, and the philosophy of science. Munter's goal is simple: to reduce avalanche deaths. He is not so much concerned with the Holy Grail of recognizing dastardly weak layers. He *is not* interested in promoting one school of avalanche thought over another. He *is* interested in lowering the number of people killed in avalanches – it's important to keep this goal in mind. By far the most avalanche victims are recreational backcountry users: skiers, boarders, and snowmobilers. By far the majority of those die because they or someone in their group enter a slope that is unstable and triggers an avalanche (the Connaught Creek incident which killed seven teens in a valley bottom this past spring is an exception to this, but the statistics are clear). Obviously, the majority of folks in fatality statistics misjudged the stability of the slope that they triggered.

Judging the stability of individual slopes at a certain time is the critical factor in reducing avalanche deaths, and it is where the traditional methods of decision-making are failing most clearly.

When observing what people actually do when they have to judge the stability of a slope, most of us will agree that they tend to rely on spot samples (i.e. pits and shear tests) far more than they should. A typical after-the-fact account in the bar: "Well, we didn't feel too certain about the headwall with all the new snow and wind, so we did a rutschblock and it looked good, so we skied it." What happens here is that people feel the need to reduce the uncertainty that they face in a crunch by using a method that introduces some degree of quantifiable data: the rutschblock fails at a certain score on a certain layer, and this information can be analyzed in a rational way. Uncertainty is reduced and we feel much better.

We know that this is not the right way to do it. But we have taught these people, and this is what they are doing. As avalanche professionals, we need to examine what we teach them, and how.

On the scientific side, there is little disagreement that there is no such thing as a representative snow profile or a representative shear test. We know that stability varies wildly across a given slope and that we have to hit a trigger to release a slope. We have actually known this since Conway and Abrahamson's 1984 study, but since its results threatened (and continue to threaten) a well-established mode of thinking, this knowledge has still not really penetrated our community. Only in recent years has the image of Jamieson's rutschblock-covered slopes begun to stick in peoples' minds.

If there is no such thing as a representative test, then it follows that we must not use such tests to judge individual slopes. Profiles, shear tests, and rutschblocks are extremely useful tools to arrive at an assessment of the overall make-up of the snowpack in a given area. Munter actually ran a research project that developed a bulletin on the basis of numerous rutschblocks, without evaluating the profile. So Munter is not at all against looking at the snow with the highest degree of skill and dedication.

Munter is about using the right tool for the right job. If digging pits won't tell us what we need to know, what will? This is where his reduction method comes in. It needs a good bulletin to be applicable, and it is to be used only in conjunction with the 3x3 filter approach and a healthy helping of mountain and avalanche experience. It is not for dummies, but for those of us stuck at the top of a run with guests behind us; and for recreational skiers, it can be a useful tool to make a decision for a particular slope.

The method is reasonably simple: ascribe a numeric value to each level of the bulletin. Put that into the nominator of a fraction. In the denominator, put in those reduction factors that apply. Those are things easily observed in the field: inclination, wind, aspect, number in party, recent snowfall. The result of that fraction is your residual risk. You set it to the level that is acceptable to you. Munter recommends that it be no greater than 1. The factors are not all of the same weight, and they do not apply in some conditions.

The reduction method needs to be seen and used in context. Whether and how it is applicable to us in the western ranges of North America needs to be discussed. But discussed it must be, by all of us.

Christoph Dietzfelbinger, M.A. (47) escaped a life in Academia by graduating as a Mountain Guide from Munich Technical University in 1981. He has made his living in the mountains ever since, as a guide, instructor, and avalanche forecaster. Losing many guide friends and colleagues in avalanches has alerted him to the fact that the snow-science based, rational approach to making decisions in avalanche terrain is failing many. Christoph now operates the Burnie Glacier Chalet near Smithers, B.C.

Editor's Note: Werner Munter will be speaking about his Reduction Method at the CAA's public safety seminars in Calgary and Vancouver on December 5th & 6th. Further information will be posted at www.avalanche.ca in October.

Red Tape Hurting Sales of Avalanche Safety Device: MP

BY DAVID ROONEY OF THE REVELSTOKE TIMES REVIEW

REVELSTOKE, BC - Transport Canada red tape is hampering the sale of a device that could save the lives of Canadians caught in backcountry avalanches, says a Canadian Alliance MP.

Jim Abbott, who represents Kootenay-Columbia riding in the heart of BC avalanche country, says the so-called avalanche airbag system (ABS) is approved for use in the United States and Europe.

It's credited with saving lives 39 out of the 40 times it has been used in real avalanches and would be valuable for backcountry enthusiasts such as skiers, hikers, and snowmobilers.

The system uses compressed nitrogen gas to inflate a pair of airbags, which allows those caught in avalanches to stay nearer the surface of a slide.

But Transport Canada has withheld approval of the device because the gas cylinder used to inflate the airbags does not meet Canadian standards.

"This is not a political problem but a bureaucratic one," says Abbott, who witnessed a recent demonstration of the system.

Although it falls short of Canadian regulations, the cylinder does meet standards prescribed by the International Air Transport Association, says Chris Green, spokesman for Mountain Safety Systems Ltd. of Vancouver, which wants to market the $800 system more widely.

Photo courtesy of The Revelstoke Times Review

MP Jim Abbott displays the ABS Avalanche Airbag System at a community event in Revelstoke, BC.

Transport Canada spokesman Rod Nelson says because the cylinders don't meet Canadian standards they cannot be shipped into the country in bulk. However, the company is permitted to import individual units containing one cylinder each. "There are two ways to do this," says Nelson. "They can ship individual airbag systems into the country or they can get the cylinders to meet Canadian standards."

Green says the manufacturer is unwilling to redesign a system already approved for use in the United States and Europe simply to meet Canadian standards. In effect, this means that while someone can purchase an individual pack, they can't purchase spare cylinders or refills.

Clair Israelson, executive director of the Canadian Avalanche Centre, says he has long been aware of the airbag system and believes it could save the lives of Canadians caught in avalanches.

"I was at an avalanche conference in Europe last year . . . (where) the chair of the mountain medicine committee presented a paper on avalanche safety technologies," Israelson says.

"He was reporting on a four-year-long study on the prevention of avalanche fatalities around the world and he identified the (airbag system) as being 10 times as effective at preventing fatalities as any other technology that exists."

The past winter was a bad one for avalanche deaths among backcountry enthusiasts in the mountains of Alberta and BC.

The 29 fatalities included 14 deaths in two slides in the Revelstoke area, seven of them high school students on a field trip from a private school near Calgary.

"Imagine if we had had those devices at the time," Israelson says.

"What they (Transport Canada officials) are doing is the equivalent of denying Canadians the option of wearing a life jacket in the mountains in winter."

The device is triggered by a ripcord worn on the upper chest. Pulling it inflates two rectangular orange balloons on the wearer's back.

During a real avalanche, Green says a skier should pull the ripcord as he is swept along by the snow. The balloons tend to keep the victim at the top of the slide, he says.

The device was used 41 times between 1991 and 2002, according to a list supplied by Green, predominantly in Europe and the Caucasus region of the former Soviet Union.

The list also includes an incident in Alberta where a skier survived an avalanche near Decker Glacier in 1999. The ABS has failed only once, according to the list, during a slide in Italy in February 2000.

Editor's Note: The ABS is being distributed in Canada by several companies and individuals, two of whom are members of the CAA: Al Safrata of Sportech Marketing, and Matthias Ahrens. Al Safrata is offering special pricing on the ABS as part of the Marmot Pro Program, which CAA Professional and Affiliate members can access in the members section of www.avalanche.ca, under Pro Programs. You can also obtain information direct from Al at (604) 922-8045 or safal@compuserve.com.

Winter 2002-2003's Fatality #29: Mt. Lady MacDonald's Lone Hiker

BY GEORGE FIELD, PUBLIC SAFETY SPECIALIST, KANANASKIS COUNTRY

On or about March 13, 2003 Jean-Francois Fecteau (JF) decided to make a solo hike/scramble towards the summit of Mt. Lady MacDonald as seen from Canmore, Alberta. As he was not one to follow the regular path, he probably ascended directly toward the summit on the left side of an obvious gully on the west face. He didn't return!

Weather on and around March 13, 2003 from Chester weather station (5500') shows temperatures max 1.0; min –15.0; HST 44cm, winds M-ST (NW) and avalanche debris below obscured areas. The Kananaskis Country Avalanche Danger Scale was:

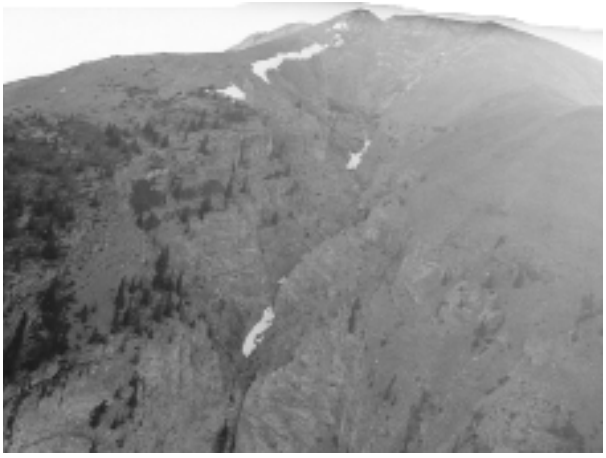
> *Alpine - Extreme; Treeline - Extreme; Below Treeline - High; with a Discussion as follows: Rain overnight and through the morning coupled with temperatures above freezing as high as 2100M (@6900') has led to a widespread cycle of avalanche activity. Loose and slab avalanches up to size 2/3 are being observed on a regular basis with most avalanches occurring at and below treeline. Most of the activity involves the entire snowpack down to the November raincrust or ground. Temperatures are forecasted to remain above freezing and no improvement in the current status is expected in the short term. Travel in avalanche terrain is not recommended at this time. If you must be out, then confine travel to low angle slopes and avoid any exposure to slopes above.*

By April 20, 2003, Kananaskis Country received a "Be on the lookout for" bulletin from Canmore RCMP. Very little information was given concerning any potential search start points.
Late evening June 6, 2003 Canmore RCMP informed George Field that hikers reported what looked like a body form in a gully on Mt. Lady MacDonald at 7400'. In discussion, because of diminishing flying light, it was agreed to look at the location in the morning.

At 0700 hrs, George, Burke Duncan, a reporting person, and RCMP searched the potential accident site. There was definitely a body at the accident site. From the Lady MacDonald teahouse site, Lance Cooper, pilot of an Alpine 407 Helicopter, heli-slung George, Burke, and RCMP to accident site. The three proceeded to make an investigation for the medical examiner.
The deceased was in a face down prone position lying across the fall line with his rubber boots still on. There was a column of snow around his upper arm and the remainder of the debris was flat with rocks imbedded along the flanks. These visual clues lead the investigators to believe that JF had been involved in an avalanche incident. We surmised that he may have reached the summit or highpoint and seen the teahouse. He was not wearing skis, a snowboard, or snowshoes. He probably attempted to cross the large bowl above the described gully.

The deceased was packaged and slung to awaiting RCMP at Canmore helipad. The investigation party was retrieved from the site. On June 18, 2003, George Field met with the mother of the deceased 20-year old Canmore resident, family friends, and Canmore RCMP. The time was spent explaining the location, position, technical snow pack information, and possible reason for the accident. The assumptions of an avalanche were accepted by all, but that did not make the debrief any easier.

On July 3, 2003, the medical examiner's office officially recorded the death "consistent with (a person) having been entrapped by an avalanche".



Left: the summit of Mt. Lady MacDonald as seen from Canmore, Alberta in June. JF Fecteau is presumed to have scrambled directly toward the summit on the left side of the gully, then traversed the large bowl above the gully, this past March 13th (The photo was cropped to remove a rotor blade). Right: a close-up of the gully where JF's body was found partially buried by avalanche debris nearly three months after he went missing

Continuing Professional Development Through the CAA Training School (CAATS)

BY IAN TOMM, SCHOOLS COORDINATOR

As many of our members know, the Level 2 program changed considerably last year with the implementation of the new modular training format. This coming schools season will see the implementation of the last module making the Level 2 program three modules and a total of 14 days of training.

One of the greatest strengths of the new program is the integration of new Level 2 students with active Level 2 practitioners in the same courses. Module 1 (Snow Science Theory and Human Factors) and now Module 2 (Terrain Skills) are open to all Level 2 graduates and Professional Members as Continuing Professional Development. Indeed many past Level 2 graduates and members have already participated on last year's Module 1 and found the experience valuable in their continued education and development as an avalanche professional.

I would encourage and recommend that all Level 2 graduates and CAA professional embers enroll in the Module 1 and 2 courses this winter as part of their professional development. You will not only find these courses valuable to your overall life learning and education, but you will be playing a vital part in the education of tomorrow's avalanche professionals. Additionally, your feedback on the courses, as a past Level 2 graduate, is extremely valuable in the ongoing enhancement of this new program.

A tentative CAATS schedule is published on pages 48-51 (dates are current as of September 1, 2003) and the schedules at www.avalanche.ca are updated regularly. If you are interested in enrolling in the Module 1 and/or Module 2 courses this winter, please contact the Schools Registrar, Carolyn Lorrain, at schools@avalanche.ca.

We look forward to seeing you all on courses this winter.

14 Snowmobilers Survive Avalanche Ordeal Near Kaslo, BC

BY BOB KEATING, MAY 27, 2003

NELSON, BC - When the avalanche came roaring down Meadow Mountain, Craig Borash grabbed a tree and rode it like a toboggan. "There is no reason why I should be alive," Borash said yesterday, fighting back tears. "God wanted me to be with my family."

The 33-year-old West Yellowstone, MT., man was among 14 snowmobilers – six from Montana, six from Washington state and two from Idaho, according to the Royal Canadian Mounted Police – who were swept away by a massive wall of snow Sunday in the remote backcountry north of Kaslo. The avalanche snapped trees like twigs and pulverized their snowmobiles. Miraculously, all 14 survived.

The slide hit just before 5 p.m. Sunday in the Meadow Mountain area in the Selkirk range as the snowmobilers were getting in a few runs before darkness fell.

Two riders were on a ridge high in the alpine. A third was making her ascent. Without warning, a huge layer of snow up to 20 metres high and nearly a kilometre long sliced away from the ridge and barrelled down the slope.

When the wall of snow first started to slide the group below was broken up into three different parties. Borash didn't have his machine running so he lunged toward the nearest trees and hung on.

"I ran for the biggest tree I could find and jumped on to it just as the wall of snow hit," recalled Borash. "It snapped the tree and down we went. I just kept bouncing around and went through some other trees with the wall of snow behind me." He says he rode the tree like a toboggan for about 300 feet before it crashed to a stop.

"By some miracle, the biggest wall of snow snow stopped 20 yards behind me." He was buried up to his shoulders in snow so densely packed it took an hour to dig him out. "I've been on Yellowstone [Park] search and rescue for 10 years and I've witnessed a lot of slides and dug a lot of people out, but I've never seen anything like this."

James Phelan, 33, an optometrist and veteran rider from Helena, MT., was in a separate party when the snow came cascading down. His machine was running and he tried to outrun the avalanche, dragging a fellow rider behind who hung on to the back for his life. "I was dragging a man hanging on to my bumper," Phelan said yesterday. "I kept looking back and the snow kept coming. I had no choice but to go off a cliff."

Phelan seriously strained his knee jumping off the cliff, and it took him three hours to crawl back to rest of the riders. He couldn't believe he was still alive. "It is a miracle no one was hurt or seriously hurt or killed," he said. "I mean, everyone was involved in this. How no one died I have no idea."

Phelan's wife, 28-year-old Melisse, also survived by hanging on to a tree as the snow spun her like a rag doll. She was buried to her head but could breathe and yell for help. "I heard people yelling and screaming to get shovels and start looking," she said. "People just ran and dug and did what they had to." She suffered a broken leg.

Although five members of the party were buried, only one person was completely buried – an unidentified teenage girl who is believed to have triggered the avalanche when she began her ascent of the steep slope. She was dug out by her frantic father. She could not breathe under the heavy snow but was pulled out alive quickly, uninjured.

Everyone in the group had beacons and most had shovels, Phelan said. Some riders started a fire to keep warm, while others located the few snow machines that were not buried or crushed, and sped off to get help.

Initially they were taken to a backcountry cabin where Melisse Phelan says it finally sank in what had happened.

"We all sat there, said a prayer and cried," she said.

A Meadow Creek guide and lodge owner, Allan Drury, helped with the rescue and said it was incredible they all came out alive. He said some of the machines were buried in up to 20 metres of snow.

"It was pure luck, first of all," Drury said. "But the slide was so heavy, water saturated, that it floated them up on top. They stayed on top. [The slide] squeezed 'em up." The Meadow Mountain area, he added, "has been red [the highest avalanche-danger rating] all season . . . they shouldn't have been on it."

Borash said he doesn't care that his snowmobile was buried by the avalanche. "I'm never riding it again," he vowed.

I'm the 16 Year Old...

POSTED ON SNOWMOBILE INTERACTIVE NEWS MAGAZINE[1] ON-LINE CHAT FORUM BY KIRSTEN SCRIBNER ON JUNE 3, 2003

Editor's Note: The Spokesman Review confirmed that Kirstin Scribner, 16, was riding a snowmobile with her stepfather, Norm Leslie, 32, on the day of the slide at Meadow Creek this past May (see pg.46). About 20 feet from the top of a steep hillside in the area known as Meadow Mountain, Kirstin saw the snow break away and start down the mountain. The RCMP estimated the slide ran for about 200 to 300 feet. Below, she describes the incident in her own words:

OK, THIS IS A LONG STORY BUT HERE WE GO.

I WAS PLAYING AROUND CLIMBING THE HILLS I HAD ACTUALLY MADE IT HALF WAY UP THE HILL THAT SLID I CAME DOWN TO ASK IF I COULD MAKE IT ALL THE WAY. MY DAD JUST SAID THAT IF I GET NERVIOUS TO GET THE SLED STUCK AND THEY WOULD COME HELP ME GET OUT.

SO I TOOK OFF HIT A LITTLE JUMP AT THE BOTTOM OF THE HILL AND CAUGHT SOME BIG AIR. I GUESS I WAS ABOUT 20 FEET FROM THE TOP WHEN IT BROKE LOOSE.

AT FIRST I THOUGH I WAS HALUCINATING THEN I REALIZED WHAT WAS HAPPENING. I TRIED TO GUNN IT TO THE TOP BUT GOT THROWN OFF MY SLED AND ABOUT 15 FEET IN THE AIR. FROM THERE ON UNTIL THE SLIDE STOPED IS A BLUR.

> ***"My dad just said that if I get nervous to get the sled stuck and they would come help me get out."***
> *– 16 year old avalanche victim, Kirsten Scribner*

YOU GET LOTS OF DIFFERENT THINGS GOING THROUGH YOUR MIND ABOUT WHAT'S GONNA HAPPEN. AND SNOW PACKED SO TIGHT AROUND MY BODY IT'S HARD TO EXPLAIN WHAT IT WAS LIKE. WHILE UNDER THE SNOW, I THOUGHT I COULD SEE THE BLUE SKY BUT THE OTHER DAT WE REALIZED THAT IT WAS OVERCAST AND NO BLUE SKY BUT MY HEMET IS BLUE SO I GUESS THAT'S PROBABLY WHAT I COULD SEE.

I TRIED TO SCREAM AS MUCH AS I COULD BUT I WAS BEING CHOKED BY MY CHIN STRAP SO I WOULD PUSH HARD AGAINST THE BACK OF IT TO RELEASE PRESSURE. AFTER SO LONG I DIDN'T THINK I WOULD BE FOUND THEN I HEARD PEOPLE YELLING SO I TRIED TO SCREAM AS MUCH AS I COULD THEN THEY PULLED A SNOW BOULDER OFF MY HEAD AND I JUST YELLED TO GET MY HELMET OFF WHICH TOOK A WHILE BECAUSE OF THE POSITION I WAS IN. I ASKED FOR A FEW PEOPLE THEN WAS TOLD THAT THE WHOLE MTN WENT. I STILL DIDN'T REALIZE UNTIL WAS UN BURIED AND I STOOD UP AND LOOKED AROUND I WAS IN A WHOLE NEW PLACE. IT WAS CRAZY.

I THOUGHT I WAS BURIED FOR 5 MIN BUT IT WAS MORE LIKE 25-30 MIN. I WAS IN AND OUT OF CONSCIOUSNESS. I'M GUESSING BUT IT WAS THE SCARIEST THING EVER IN MY LIFE. I'M JUST SO HAPPY TO BE ALIVE.

NOW I JUST REST ON THE WHAT MIGHT HAVE BEENS. BUT I WILL GET OVER IT WITH TIME. IT WAS ALSO ONE OF THE BEST TIMES I HAD EVER HAD SNOWMOBILING, WELL FRI. AND SAT.

I DON'T WANT ANYONE BLAMING MY DAD OR ANYONE ELSE THAT WAS THERE ABOUT WHAT HAPPENED. IT'S NO ONE'S FAULT.

I DONT KNOW FOR SURE BUT ALREADY I'M MISSING REVY!! CALL ME CRAZY BUT IT WAS MY FIRST TIME THERE AND IT WAS AWESOME. I MET A LOT OF REALLY COOL PEOPLE ALSO. SOME TIME SOON I WANT TO GO RIDING AGAIN MAYBE YELLOWSTONE BUT STILL A LITTLE GUN SHY I GUESS.

[1] www.snowmobile.ca under "14 sledders survive avalanche!" go to "more comments."

Avalanche Safety Courses for Industry: Updates, Locations and Dates for 2003/2004

Snowmobile Operations – Avalanche Training for Snowmobile Professionals

The Snowmobile Operations course is designed and geared for snowmobile touring operations and trip leaders at a technical observation level. The Canadian Avalanche Association has worked with the Alberta Snowmobile Association (ASA), BC Snowmobile Federation (BCSF), BC Member Clubs, and snowmobile industry and trip leaders to make this course available. The course is an introduction to avalanche safety and detailed weather, snowpack, and avalanche observations. There will be emphasis on recognizing avalanche terrain, safe travel techniques, and self rescue.

In the spring the BCSF initiated a project to take a look at the CAA's snowmobiling curriculum and try to address some of the issues surrounding the continued decrease in enrollment and subsequent cancellations of these courses. Throughout the summer the CAA, representatives from the BCSF, the ASA, and a few other stakeholders have been reviewing the curriculum, manual and lesson materials in preparation for a Snowmobile Curriculum Workshop being held in Revelstoke this September. While the attendees for the workshop have already been finalized, you are encouraged to submit your thoughts on professional avalanche training for the snowmobiling industry to the BCSF or the CAA directly (c/o Ian Tomm at 250-837-2435 or ian@avalanche.ca).

There are exciting new developments as a result of this collaborative effort and we hope to have a new and improved snowmobile course ready for a Beta test by early season, location still to be announced. Industry stakeholders who wish to be a participant of this course are encouraged to contact Ian Tomm, the Schools Coordinator, to express their interest in attending.

Location	Dates	Max Students	Course Cost	Availability
TBA	TBA	18	$1200	TBA
Terrace / Smithers * Combined Ski Ops, TRI and Snowmobile	Feb 15 - 22 Sun - Sun (8 days)	24	$1400	1 of 24 filled

* This will be a combined course for Ski Operations, Snowmobiler Operations, and the Transportation and Resources Industry (TRI), to help ensure that the minimum enrollment of 24 students is met.

Dates for future courses will be posted at www.avalanche.ca after the Program and Curriculum Redevelopment Workshop is completed at the end of September. Interested individuals or organizations are encouraged to contact the schools registrar directly at 250-837-2435 to express their interest in attending the revamped Snowmobile Operations course and recommend preferred dates and locations. We will do our best to offer a course in a location that will work for those interested in the program. We will require a minimum of 12 students to run this course.

Level 1 Ski Operations*

This course is basic training for persons who are developing skills for employment with avalanche safety operations. Participants must be advanced skiers or snowboarders and should have considerable backcountry ski touring or snowboarding experience in order to meet industry standards.

Location	Dates	Max Students	Course Cost	Availability
Monashee Powder Adventures Lodge	Nov 28 - Dec 5 Fri - Fri (8 days)	24	$1200	5 of 24 filled
Kokanee Glacier**	Dec 13 - 20 Sat - Sat (8 days)	16	$1200	FULL
Blue River**	Dec 6 - 12 Sat - Fri (7 days)	24	$1200	4 of 24 filled
Whistler	Dec 3 - 9 Wed - Tues (7 days)	24	$1200	FULL

Location	Dates	Max Students	Course Cost	Availability
Fernie	Jan 4 - 10 Sun - Sat (7 days)	24	$1200	4 of 24 filled
Golden	Jan 18 - 24 Sun - Sat (7 days)	24	$1200	2 of 24 filled
Ptarmigan Hut**	Jan 18 - 25 Sun - Sun (8 days)	12	$1200	5 of 12 filled
Ptarmigan Hut**	Jan 25 - Feb 1 Sun - Sun (8 days)	12	$1200	4 of 12 filled
Terrace / Smithers Combined Ski Ops, TRI and Snowmobile	Feb 15 - 22 Sun - Sun (8 days)	24	$1400	1 of 24 filled
Lake Louise	Feb 25 - Mar 2 Wed - Tues (7 days)	24	$1200	FULL
Lake Louise*	Mar 2004 overflow course	24	$1200	OVERFLOW

* Overflow Courses will be added as enrollment dictates.
** This is a hut-based course. Please refer to the on-line course description at www.avalanche.ca for more information.
*** This is a combined course for ski operations, snowmobiler operations, and the transportation and resources industry (TRI). A minimum enrollment of 24 students is required for this course to run.

Avalanche Courses in Quebec

Type of Course	Dates	Max Students	Course Cost	Location
SAR/ARAC	Feb. 24-29	30	TBA	Nunavik
SAR	March 2-5	16	$450	Gaspésie
Training course for RAC providers	March 2-5	8	$300	Gaspésie
CAATS Level 1	March 7-13	16	$1000 (subsidized)	Gaspésie

Transportation and Resource Industry (TRI)

This course is an introduction for supervisors and technicians who are concerned with the construction, maintenance, and safety of transportation facilities, routes, and utilities. They may be involved in the collection of weather, snowpack, and avalanche activity data. In general, these persons do not use skis in the course of their duties.

Location	Dates	Max Students	Course Cost	Availability
Rogers Pass	Feb 15 - 22 Mon - Sat (6 days)	24	$1000	1 of 24 filled

Operations Level 2

The Operations Level 2 Course is an advanced program for personnel who work full time with avalanche safety and control operations. Participants must have at least 100 days of field experience, making and collecting weather, snowpack, and avalanche activity observations before applying to take Level 2 program. This generally requires at least two years of active field work and experience with an established operation.

This new program splits the former Level 2 course into three modules. Module 1 (M1) is a four day classroom based theory course focusing on human factors in decision-making, advanced snow science concepts, and operational risk management. There is no evaluation in Module 1. Module 2 (M2) is a 3.5-day field-based terrain module where students have the opportunity to further develop, apply and refine concepts introduced in Module 1. The seven day Module 3 (M3) is comprised of equal time spent in the field and classroom focusing on operational decision making. The format of this module is very similar to past Level 2 programs, with the addition of Module 1 and 2 content where applicable.

MODULE 2 (3.5 DAYS) - 2003/04				
Location	**Dates**	**Max Students**	**Course Cost**	**Availability**
Revelstoke	Oct 27 -30 (4 days)	36	$1000	35 of 36 filled
Revelstoke	Nov 18 - 21 (4 days)	36	$1000	OVERFLOW
MODULE 2 (3.5 DAYS) - 2003/04				
Location	**Dates**	**Max Students**	**Course Cost**	**Availability**
Blue River	Dec 12 - 15 (3.5 days)	18	$450	FULL
Whistler	Dec 17 - 20 (3.5 days)	18	$450	FULL
NumTiJah Lodge	Jan 9 - 12 (3.5 days)	18	$450	17 of 18 filled
MODULE 3 (7 DAYS) - 2003/04				
Location	**Dates**	**Max Students**	**Course Cost**	**Availability**
Golden	Jan 25 - 31 (7 days)	18	$1500	17 of 18 filled
Golden	Feb 1 - 7 (7 days)	18	$1500	FULL
Golden	Feb 8 - 15 (7 days)	18	$1500	OVERFLOW

Continuing Professional Development: Modules 1 and 2 are open to past graduates of the Level 2 program as continuing professional development and training. The Human Factors content, Advance Snow Science curriculum, and Operational Risk Management content is entirely new to the CAA Training Schools program and is a valuable asset to all current practicing avalanche professionals.

Avalanche Control Blasting Program

This course provides training in the safe application of avalanche control blasting operations. This course has been designed by explosives and avalanche industry experts and with the generous assistance of the BC Workers' Compensation Board. The two-day course covers core content that is common for all avalanche control blasting, followed by industry endorsed procedures for hand charge, cornice, helicopter, and avalauncher missions

NOTE: This course does not result in WCB Blasting Certification. However, this course will be excellent preparation for the WCB certification exam. For WCB's current test and prerequisite information for certification, please contact WCB directly at their head office in Richmond, BC: 604-231-8888.

Location	Dates	Max Students	Course Cost	Availability
Revelstoke	Oct 11-12 Sat - Sun (2 days)	24	$200	1 of 24 filled

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Avalanche Incident comes as a *Choc* in Quebec

BY STEPHANE GAGNON, ASSISTANT COORDINATOR OF THE HAUTE-GASPÉSIE AVALANCHE CENTRE

Last March 4th, moments after the end of the first Level 1 Ski Operations avalanche safety course in Quebec, an avalanche struck a large group of skiers and boarders only a few kilometres from the spot where the class had just finished. Within minutes, three CAA members were on hand to respond.

It was near the end of the day when our class wrapped up at the Gîte du Mont Albert (Lodge) in the heart of the Chic Choc range, and most of the students had already left. Instructors Sylvain Hébert, Marc Deschênes, and I were hanging out with two of our Level 1 graduates. We were just getting ready to go for a ski together up the Hog's Back when someone came in yelling that there had been an avalanche up the road. We thought it must be some kind of prank our class was pulling, but the look in the messenger's eyes told the truth. We jumped in the car and were on the scene within five minutes.

We arrived at a chaotic scene – a number of people unexpectedly *rode the Hog* in two skier-triggered slides only minutes apart. People were popping out of the trees everywhere none were our graduates, thankfully. No one was sure if anyone was buried and none of the survivors had any avalanche gear. We could see no visual clues and light was fading. To skin up to the top of the slide path would take us an hour and a half. We could see overhanging obstacles near the fracture lines. One group had already loaded a person with a torn ligament into a car and were getting ready to leave for the hospital. We immediately decided to split our group. I went back to the base lodge with a radio (and the injured group) to question anyone who might show up there for more info, while Sylvain, Marc, and our graduates stayed at the base of the slide with our other radios, doing head counts.

After a half hour of counting heads, all the people involved in the slide had been accounted for. In total, 14 people in four separate groups were involved in the two nearly simultaneous slides: one skier in the south bowl and seven skiers and six boarders in the north bowl (see photo below). None had any avalanche safety equipment (well, one person had a probe).

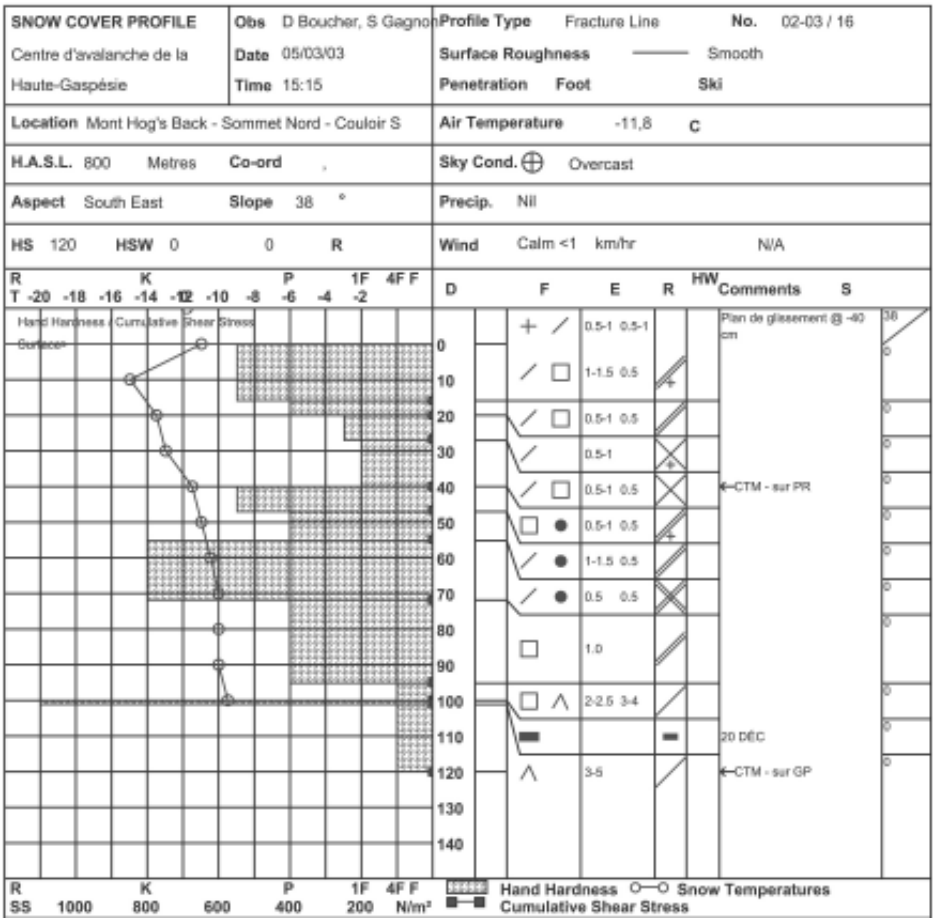
14 people unexpectedly *rode the Hog* in two skier-triggered slides only minutes apart on the Hog's Back, this past March in the Chic Chocs of Quebec.

This situation has reinforced our growing need to educate the eastern community on the hazards of backcountry traveling. Thanks to the QCAP project and the Avalanche Center in Haute-Gaspésie, Chic Chocs, more and more people are aware and informed about backcountry travelling through courses and a twice weekly avalanche bulletin. Starting this year the bulletin will also give readers the standard stability rating bringing the bulletin to maturity.

Thanks to everyone who has helped develop and has supported our goal over the past two seasons of making the northeastern mountains a safer place to play.

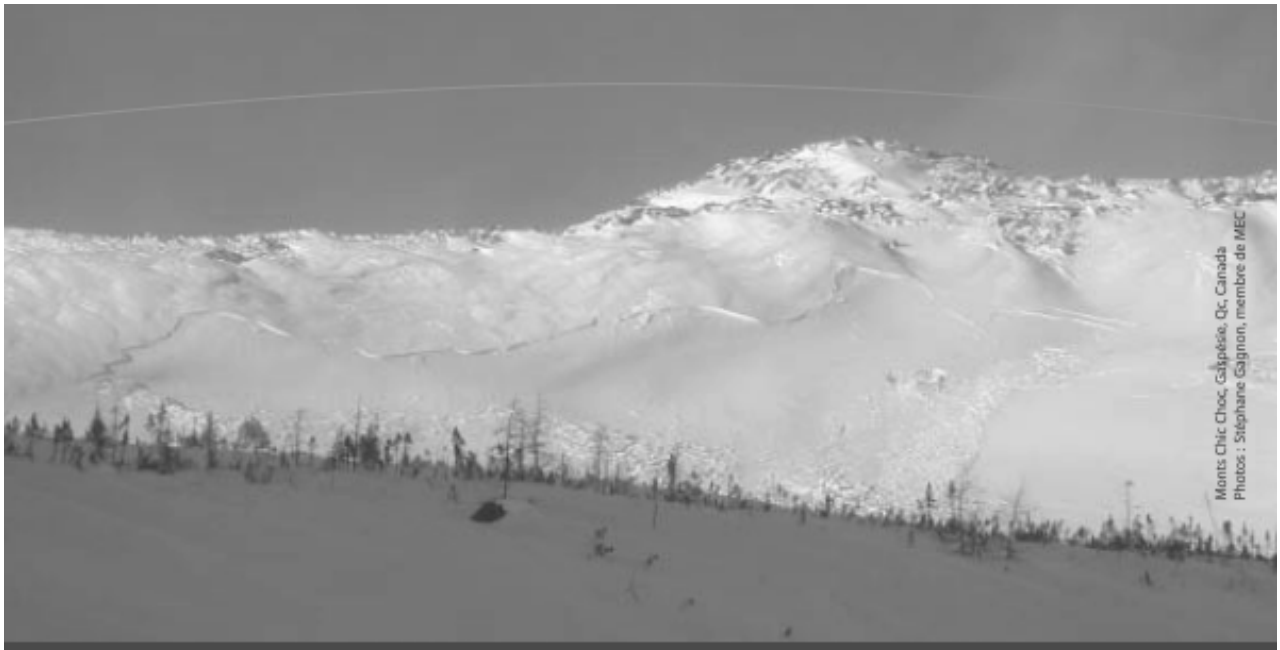
Left: Dominic Boucher checks out the crown in the south bowl the day after the slide. It was 1.6m at its highest point.

Below: Test profile taken near the sight of the March 4th avalanche, which slid on a layer of decomposing and fragmented snow particles (df)



MEC Helps Raise Avalanche Awareness in Quebec

The CAA would like to thank **Mountain Equipment Co-op (MEC)** for continuing its tradition of promoting public avalanche safety. The company recently launched its inaugural French catalogue with a back cover dedicated to the message "Avalanches: A Quebec Reality."



Les avalanches : une réalité québécoise.

Une avalanche est provoquée par un cumul de facteurs dont la température, l ensoleillement, l accumulation de neige et le degré d inclinaison d une pente. En conséquence, toute pente de neige peut devenir un site d avalanche, lorsque les conditions sont propices. Avant de pratiquer une activité en montagne comme le ski hors piste, le ski de haute route, le télémark, le ski de fond et la raquette, il est important de se renseigner sur les conditions locales d avalanches et fortement recommandé de suivre une formation appropriée. Pour en savoir plus sur les avalanches au Québec, consultez le site du Centre d avalanche de Haute-Gaspésie, au www.centreavalanche.qc.ca. Le CAHG est membre associé de la Canadian Avalanche Association. Des responsables du CAHG organiseront, cet automne et cet hiver, des activités de sensibilisation et des formations au magasin MEC de Montréal.

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ou résident actuel

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Couverture :
Monts Chic Choc, Gaspésie, Qc, Canada
Photo : Pierre Dunnigan, membre de MEC

The New TT 457 Training Transmitter

A common problem on avalanche safety courses: you want to teach beacon search techniques, but you don't have enough space available. To teach the entire search process, from coarse to pinpointing, you need an area of at least 50 m by 50 m – ideally blanketed by something resembling avalanche debris. But compacting that much snow can chew up valuable teaching time.

Now the problem is solved. Barryvox is introducing the new Training Transmitter TT 457, which enables instructors to demonstrate all imaginable search scenarios on an area of about five metres by five metres. Even a large indoor table will do.

The TT457 has some incredibly versatile features. Inside the battery compartment of the beacon are switches for selecting different levels of transmitting power and signal characteristics. You can set the TT 457 to transmit the pattern of a particular beacon, e.g. the Mammut Barryvox or the Tracker DTS, but at a signal strength which reduces the range by a factor of 10. The signal intensity at three metres will then correspond to the signal at a distance of 30 m when using a regular beacon as a transmitter. This enables you to teach everything inside a suitable room!

The capability of mimicking all beacons currently available on the market also permits realistic simulations of multiple burial search scenarios.

The TT 457 Training Transmitter is a small device about the size of a matchbox. It weighs only 75g and usually operates for more than 500 hours on a normal battery.

For more information, contact:
Girsberger Elektronik AG, Mettlenstrasse 33b, CH-8193 Eglisau/Switzerland
Tel: ++41 (0)1 867 00 49, Fax: ++41 (0)1 867 31 12
E-mail: info@girsberger-elektronik.ch, Internet: www.girsberger-elektronik.ch

Barryvox's new training transmitter is ready for training (left). With its battery hatch open (right) you can see the switches that allow the user to select different levels of transmitting power and signal characteristics.

Job Postings

If you have a job posting you would like to submit, please forward it to editor@avalanche.ca.

Wanted

AVALAUNCHER - Kicking Horse Mountain Resort is looking for a used Avalauncher gun for this winter. Must be operational and preferably NDT tested. Please contact Steve Parsons at avalanche@kickinghorseresort.com , tel. (250) 439-5422 or Mike Rubenstein at mountainsafety@kickinghorseresort.com, tel. (250) 439-5459.

BCA Introduces New Alpine Touring Binding

BOULDER, CO (June 9, 2003) Backcountry Access (BCA) announced today that it will market and distribute the revolutionary new Naxo alpine touring (AT) binding in North America, effective immediately.

The Naxo nx01 is a super high-performance AT binding from Switzerland with a full alpine toepiece, maximum DIN setting of 12, and an innovative "virtual rotation system" that increases stride ergonomics while touring. It was developed by Naxo AG of Thun, Switzerland, a company founded in 2001 by former managers at alpine touring manufacturer, Fritschi AG. Naxo was introduced to the European market during the 2002-03 season.

The crux of the Naxo design is its beefy toepiece and virtual rotation system. By providing two pivot points one beneath and one in front of the toepiece, the system allows for a full-sized alpine-style toe conforming to DIN standards for both alpine/downhill and alpine touring boots. It also creates a more rounded gait, reducing the "Frankenstein" stride often experienced with existing AT bindings, according to McGowan. In addition, the heel piece locks down in such a way that it cannot prerelease due to flexion of the ski. Binding length and spring tension at the toe and heel can be adjusted quickly by hand, making it ideal for rental use.

For more information, contact Bruce Edgerly at edge@bcaccess.com or (303)417-1345.

Snow Avalanche Management in Forested Terrain

Snow avalanches are a common phenomena in most mountain ranges of British Columbia. This land management handbook is a must have for natural resource managers, ski hill and land developers, backcountry tour guides, forestry workers, and winter recreationists. This book presents a risk assessment procedure suitable for incorporation in the terrain stability field assessment process. This book outlines harvest design and silvicultural strategies to reduce the risk of snow avalanches. Approaches for managing avalanche risks in winter are also presented. An extensive bibliography is included, along with links to relevant publications, data sources, and resources available on the internet.

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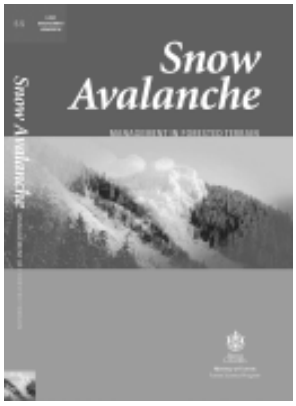

Humour

BY TAMMY KNIGHT

New Board Member Profile

Four members were elected to the Board of Directors at the AGM in Penticton, May 5-9, 2003: Alan Jones (Director at Large), Alison Dakin (Director at Large), John Birrell (Director for Associate Members), and Lori Zacaruk (Director for Affiliate Members). To introduce these member representatives, we are featuring a profile of each over four issues of the Avalanche News. In the last edition, we profiled Lori Zacaruk. This edition we introduce:

Name: John Birrell
Age: 54
Lives in: Fernie, BC
Employer: Island Lake Resort Group, Island Lake, and Powder Cowboy Cat-Skiing
CAA Member Since: Level 1 CAA since 1997
Years involved in Avalanche Safety: Eight years directly involved between guiding and management, a further 10 years indirectly involved as management overseeing outside operations at ski resorts.
Preferred method of snow travel: Skis
Number of days on snow per year: Last couple of years 20-25, prior to that 50-100+

Bio: 35 years in the ski industry as a certified ski instructor, ski coach, and guide as well as many years of general management. He has held various volunteer Board and committee positions with the following organizations: CSIA, CWSSA, CSGA, BCHSSOA, and Whistler Tourism.

Hope as a Director: To help to increase strong associate and outside business partnerships which will support us financially and help us get the message out about safety. To help set up a succession plan to maintain and further our staff and management roles within the organization.

Biggest Challenge Facing the CAA: Ongoing sustainable funding and enough qualified staff as the organization grows and demands and expectations for our services increase.

What I have learned about avalanches: Expect the unexpected every run. AN AVALANCHE DOESN'T KNOW YOU ARE AN EXPERT!

New President of the BCHSSOA

Walter Bruns was recently appointed the new President of the BC Helicopter & Snowcat Skiing Operators Association (BCHSSOA). His background in the industry spans 25 years with Canadian Mountain Holidays — as a driver, maintenance guy, mountain guide, lodge manager, operations manager, and now president.

According to Walter, the main challenges facing the BCHSSOA are:

- rapid growth of the association through the addition of many new, up-and-coming heli- and cat-skiing businesses
- meaningful representation of the members in the face of an increasingly complex business environment
- continued attention to operational safety standards
- implementation of environmental guidelines for best practices
- a host of area- or operator-specific land-use issues

Over the next few years, Walter sees the BCHSSOA growing, gaining visibility and credibility, and adding value for all members.

For more information on the BCHSSOA, visit www.bchssoa.com

CAA's New Data & Computer Systems Tech

BY TODD BEERNINK

With InfoEx data and a host of other databases growing rapidly, the CAA executive realized it was time to hire the equivalent of a gardener to keep our electronic information healthy. We are pleased to welcome Ryan Gill on board as our new Data and Computer Systems Technician. He will be working out of the CAA's head office in Revelstoke, BC.

After graduating from the University of Victoria (B.Sc. 1998), Ryan moved to Terrace, BC where he spent summers working as a field biologist and winters ski touring in the northern Coast Range. He moved to Revelstoke two years ago to "take advantage of some of the best ski-touring and mountaineering opportunities in North America — all within four hours of home!"

Ryan owns a house about 10 blocks from the Canadian Avalanche Centre with his wife, Ann-Marie Conway, and the two try to spend as little time in it as possible. This past summer they paddled in the Queen Charlottes and spent a month mountaineering in the Selkirks, Coast Range, Valhallas, and the Rockies.

Todd and Ryan working together out of the office on a Rutschblock.

Ryan brings some interesting technical skills to the CAA, such as database management and training in ArcInfo and ArcGIS. Two days into his job, Ryan is creating an inventory of all the databases and has found 25 so far. The next step for him will be to consolidate all the data into one place to make it more accessible and usable for our staff.

In the future, Ryan will help implement a web-based InfoEx using an XML file format to transmit its data. This system will be in development and testing this winter and ready for full industry release by 2004/05 (for more information on this development, see p. 29 of Vol. 65, the summer edition of the *Avalanche News*).

CAA's New Sponsorship & Events Coordinator

BY CLAIR ISRAELSON

I am pleased to introduce Todd Beernink as the new CAA Sponsorship and Special Events Coordinator. Working from our headquarters in Revelstoke, BC, Todd will be responsible for CAA sponsor relations and events that promote CAA public safety services.

No stranger to the local CAA office, Todd volunteered to organize Revelstoke's first Avalanche Awareness Days in 2002 then again in 2003. He says that "showing people how to have a good time in the backcountry and live to appreciate another day — that's what it's all about."

Todd comes to the CAA with a six-year background in marketing, particularly in the development and promotion of new products and services. He most recently worked for the Okanagan University College where, in partnership with Parks Canada and other stakeholders, he helped create an educational adventure program called Revelstoke Edventures. This past March, Todd also began working as the editor of the *Avalanche News*.

Todd got his start in the snowsports industry as Panorama's first snowboard instructor back in 1993 then taught for Blackcomb while completing his B. Comm. at the University of Victoria. He is a graduate of the CAA Level 1 Avalanche Safety for Ski Operations course who enjoys skiing, sledding and boarding in the backcountry near Revelstoke.

Todd's mountain lifestyle and experience with the development and promotion of outdoor programs gives him a personal appreciation for our stakeholders' interests. We wish him the best of luck in raising public awareness and the funding we need to support our collective goals.

Banff Musician Creates a CAA Benefit Concert

BY GENEVIÈVE SVATEK OF THE BANFF CRAG & CANYON

Adam Goring / The Banff Crag & Canyon

Garry Gonis loves music and skiing in Banff's backcountry. He wants to help prevent avalanche deaths. Gonis is pictured here with his dog Mazy, who often accompanies him on his backcountry ski trips.

Banff musician Garry Gonis is putting his love for music and the mountains together for a benefit concert for the Canadian Avalanche Association.

Proceeds from the concert and silent auction will go towards the association to promote avalanche awareness. Gonis organizes acoustic concerts at Bruno's Bar & Grill but decided to organize a larger concert with several acts.

"Since last year was a bad winter for avalanches I though I would put together a benefit concert," said Gonis, an avid backcountry skier. He approached Clair Israelson of the Canadian Avalanche Association, who gave him his complete support.

The concert will take place on Oct. 29 at the Fairmont Banff Springs Convention Theatre. Gonis is currently selling tickets and seeking donations from local businesses for silent auction items. Sponsors will be invited to display their banners. The concert will headline Lori Reid, Lin Elder, and Jenny Allen, three musicians who often play in the Bow Valley and have recently joined forces in a recording. The trio will present some new songs from their studio work in the benefit concert.

Six years ago, Allen's friend died in an avalanche. "He was an avid climber and backcountry skier," said Allen of her friend who died in a freak avalanche near Canmore. "That's why I'm involved," she said.

"It's a great venue and a great place to have it," said Elder. The concert is called Harmony after a signature that acclaimed climber Lynn Hill inscribed on Gonis's guitar last year. Music + Mountains = Harmony. The concert will also feature performances by Marty & Russ of New Moon, Sarah Harper, aka Lightning Girl, and Gonis and Ricardo in Et-Al.

"These musicians have been playing in the valley for years, they just don't get the breaks," Gonis said. "The performers are just as good as any popular musicians".

Tickets are $35 and available at Bruno's Bar & Grill and Substance Music in Canmore or by calling Garry at (403) 760-5059.

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