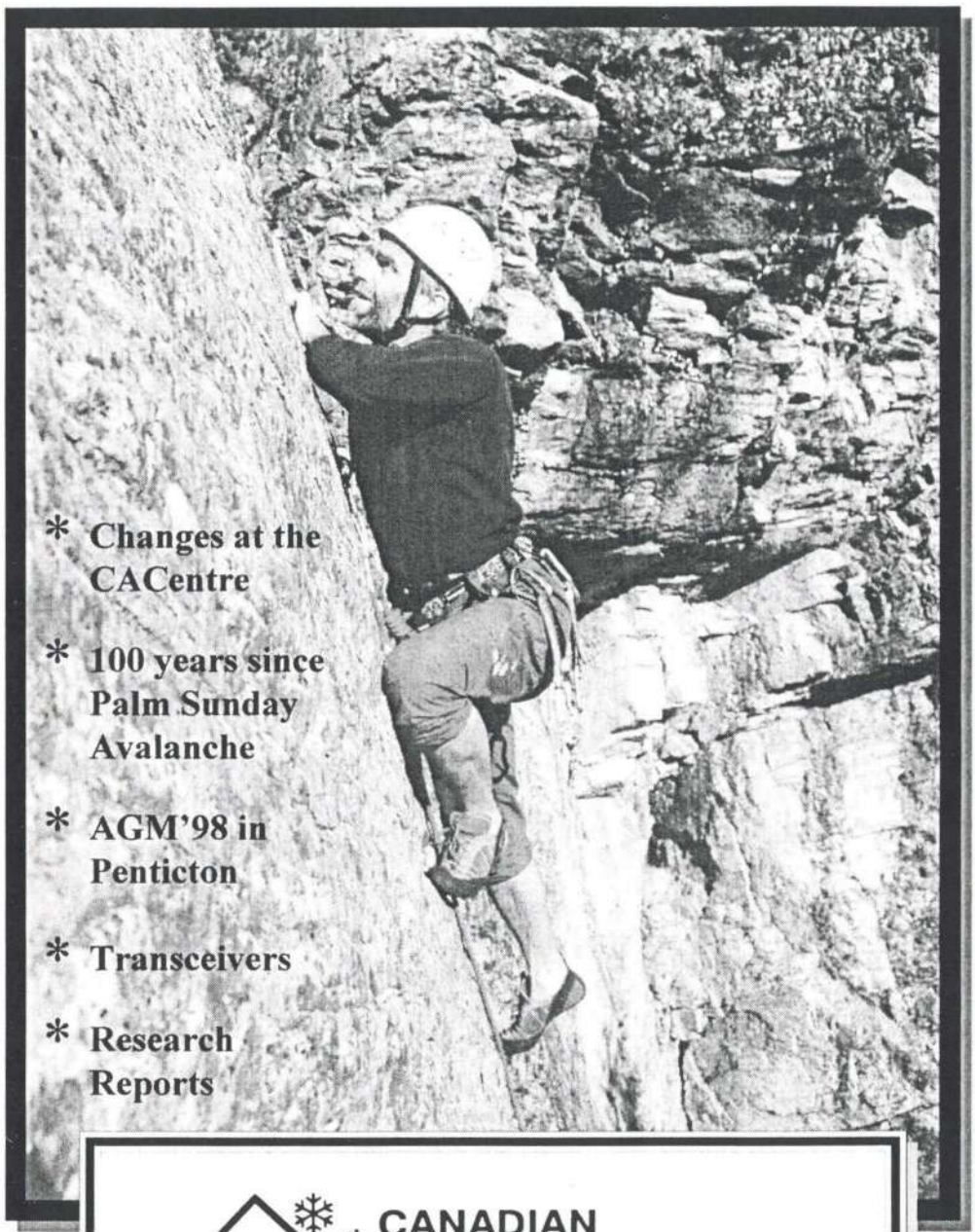
AVALANCHE NEWS

SUMMER 1998 VOLUME 55



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CANADIAN AVALANCHE ASSOCIATION

AVALANCHE NEWS

SUMMER ISSUE VOLUME 55

Front Cover Photo By Jim Maitre

CANADIAN AVALANCHE ASSOCIATION

WEIS WORDS

FROM THE PRESIDENT

I was looking forward to some time off following the meetings in the spring...but the CAA just keeps rolling like the old fashioned cartoon version of the mighty snowball avalanche, gathering momentum and characters as it speeds along! Boy it is still very busy!!

The spring meetings and related activities were a big success, largely due to the strong attendance and participation. In an era where the trend of volunteer time and extras from "the population" seem to be on the endangered list, I am pleased to say that we are an exception.

We as an Association, are making staggering progress on two distinct and separate mandates: Professionalism and Public Programs. I am a firm believer that by improving one end of the organization we will always improve the other. So if we improve both ends, the results should be excellent. Thanks to the Members for their vote of confidence on so many initiatives.

By next winter the Canadian Avalanche Centre, and the programs we administer there, will be changed and improved. Technology, systems and staff are combining to make us nearly "state of the art". Some strong financial management, new funding of projects and the growth and commitment of the Member base will allow us the time and resources to get things running really efficiently.

As a CAA Member, Industry participant or reader I ask you to continue your positive support of the CAA. Tell others what we can do for them. Ask your self what can I do for the CAA? Tell us what we can do for you? Make this association your own.

I would like to take this opportunity to thank the Members, Staff and Directors for their support of the CAA and my position, this past year. For this current year I have committed to serving for a second term as the President. I look forward to serving you and the avalanche community in the best way that I can.

Have a safe and fun summer,

Niko Weis

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FROM THE EDITOR'S DESK

I hope that you will bear with me and forgive any mistakes that may occur in this newsletter. This is my first experience being an editor or publishing a newsletter. It has been a very challenging and nerve racking experience. Now that it is finally finished I am able to jump in and begin the new challenge of learning about the schools programs. I will be working with Phil in the schools department and will hopefully get a chance to know some of you.

Now that I have introduced myself, I would like to take the opportunity to introduce to you the rest of the team at the Canadian Avalanche Centre. Evan Manners is of course our office manager whom I am sure most of you already know. Audrey Defant is in charge of our membership, Pat Hutchison is the office assistant, Barb Levirs is the bookkeeper and Lynn Freeland and Lisa Longinotto are the Infoex technical staff. Not to mention all of the out of office support staff.

I am looking forward to receiving articles, photos and stories from our membership to be published in future newsletters. Please feel free to send in anything you would like to share with our readers.

The deadline for the fall issue will be November 1st. Enjoy the rest of the summer.

Heather Buerge

Heather Buerge

About the author

The author of this issues history article " Site of the Palm Sunday Avalanche" is Frank Norris. Frank has lived in Anchorage Alaska since 1983 and spent most of the 1980's in Skagway, where he was a park ranger and historian. He has written on a variety of topics, but a primary interest has remained the Klondike and other northern gold rushes. His write-up on the Palm Sunday avalanches was part of an unpublished historic structures report of the Chilkoot Trail, which was written in 1985-86. He and fellow historian David Neufeld are the authors of "Chilkoot Trail, Heritage Route to the Klondike," which was published in 1996 by Lost Moose Press in Whitehorse.

Changes at the Canadian Avalanche Centre

by Evan Manners

It was just like any other Monday morning in the spring around the Canadian Avalanche Centre in Revelstoke. All the winter seasonal staff were still on, despite the fact most member companies were shutting down operations for the season. Everyone was busy working toward preparing for another fast paced Spring Annual General Meeting to hear the member's wishes and report on the previous year's goings on. Alan Dennis called the staff together for another of our general staff meetings, and then opened the meeting with an announcement that spawned total silence. He had decided to resign as Managing Director of the Canadian Avalanche Association and wanted to tell the staff around him before they heard it elsewhere. He explained that the Centre had grown in the near decade that he had been at the helm, and his personal goals drew him away from what the job and the Centre had become, to something a little closer connected to the field work of the industry.

Staff members' reactions were interesting in retrospect. I personally was so stunned that I was not able to do anything productive for some time. One staff member came into my office and accused Alan and I of cooking up a joke on them, stating his announcement could not be true. Another asked sincerely if the Canadian Avalanche Centre would be closing. The mayor of Revelstoke also had the same concern once word got around town. To virtually all of us, the name Alan Dennis and the Canadian Avalanche Association are one and the same. Happily, Alan has since indicated that he has every intention of continuing as an active professional.

Alan has worn many hats, including some interesting stints as a cowboy, raft guide, ski resort regular, in addition to his 30 odd years in the Avalanche profession. Chris Stetham, who was president of the CAA at the time Alan was hired, once related his vivid memory of Alan walking into the interview in a three-piece suit, but talking snow with the best of them. He was hired shortly after the Canadian Avalanche Centre opened in 1991 to run the Centre's operations, and worked with the volunteer Board of Directors to get the concept off the ground. Alan hired Ingy Annhorn as schools registrar/bookkeeper/receptionist, and the operation officially transferred to the non-profit Canadian Avalanche Association. The Centre opened with a startup grant from the National Search and Rescue Secretariat (NSS), which allowed the Association to focus on starting several new initiatives. The first to begin was the now world renowned Infoex™, which started up with 32 subscribers and a rather advanced FAX in a one room office above the Post Office in Revelstoke. Soon, one of the new fangled 286 computers ar-

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rived on the scene, and Alan hired the first Infoex ™ manager to put together a BBS. Alan still worked night shifts preparing Infoex™ with his new employee, Chris Whalley.

With the immediate acceptance of Infoex™ from the majority of the industry, it was off to a strong start and has continued to grow ever since. The next planned initiative was to begin producing information for the public, to raise safety standards throughout the profession. The first Public Avalanche Bulletin service began in Alan's second winter, with approximately 800 requests for information (the 1997/98 season had 125,000 requests). The public doubled its user base consistently for many years, and with Infoex™ expanding every year, the baseline information feeding into the bulletin improved in quantity and quality, further driving public acceptance and demand.

Alan was getting busy enough that he had to abandon his night shifts preparing Infoex™, and the Centre's fourth employee was hired to keep Infoex™ going seven days a week. A series of large projects followed on the heels of Infoex™ and the Public Bulletin, with Data Standards producing a re-edit of the Operational Guidelines series of documents, a massive upgrade to the Avalanche Training Schools material, the video *Beating the Odds*, the book *Avalanche Accidents in Canada Volume 4*, and the Recreational Avalanche Course program joining the list of accomplishments. By this time, he was in virtually constant year round demand for speaking appearances at seminars, trade shows, television documentaries, representing Canada on various committees internationally, and as a ski touring partner around Revelstoke. The Centre had grown to 12 part and full time staff, had a small LAN system of 7 computers, had moved operations 3 times until it occupied 1400 sq/ft of office space, and had an annual budget which nudged the million dollar mark.

Alan's decision to persue other personal goals is certainly going to have a significant impact on us all. Alan has given much of himself for the good of our Association, and it is up to us to carry on, and make Alan proud to continue as a member. It was his wish to quietly leave the Canadian Avalanche Centre, without any fanfare, despite the fact he certainly has earned it. It was with obvious emotion that Niko Weis, the current president, announced Alan's resignation to the membership at this year's Annual General Meeting May 7th. It was fitting to hear an immediate motion from the floor nominating Alan as a life member of the CAA, an honor bestowed on very few others. The motion passed unanimously.

We will all miss Alan's constant presence at the Canadian Avalanche Centre, but hey, he'll likely be easier to convince to get out and rip up a new dump of powder than he was the last few seasons.

Continuing Professional Development:
CPD Program Development for CAA Professional Members

Our society today is undergoing great changes. The accelerating pace of innovations in technology and methodology, the growth of information and knowledge, shifts in economic and competitive pressures, and the public's increasing expectations of professional performance by specialists are but a few examples. As active avalanche safety practitioners, it is no longer enough, if it ever was, to rely on our initial training, qualifications and credentials to maintain our competence throughout our careers. Nor can we rely on our employers to provide everything we need to develop our skills and experience. Increasingly, as active avalanche professionals, we are expected to take responsibility for our own lifelong learning and continuing development.

A continuing professional development program enhances a culture in which competence and professional behaviour is expected from the members of an association. The Canadian Avalanche Association (CAA) supports both the concept and the practice of member continuing professional development, believing it to be essential to effective, competent performance. This belief is enshrined in the Code of Ethics of the CAA, which states:

Professional Members accept responsibility to undertake continuing professional development to ensure the currency of their knowledge, skills and technical competencies within their areas of practice, to meet society and industry expectations.

Many professional associations are moving toward mandatory continuing professional development in Canada, the United States, Europe, the United Kingdom and Australia. Society, consumer groups and government view such programs as one way in which professionals continue to upgrade and demonstrate their skills and knowledge in their areas of specialization. Retaining professional competence is a professional responsibility which reflects an individual's employability, and elevates his/her professional stature as a CAA member.

The CAA recognizes its responsibility to encourage and facilitate the advancement of its members' professional abilities. Thus, in 1998, the CAA, with the support of the membership, established a mandatory Continuing Professional Development (CPD) Program, intended to encourage members to maintain and upgrade their competence through involvement in a wide range of learning experiences. The program guidelines establish a standard for CAA members committed to maintaining and further developing their professional competence.

At the May 1998 CAA annual general meeting, the CPD program was formally approved by the membership. The CAA looks forward to the positive impact this program will contribute to continuing and increasing membership professionalism.

We have tried in the last few issues to provide some information on avalanche events, that have had an impact on Canadian history. The article in this issue took place on territory claimed by Canada when it occurred, but is now part of the USA by approximately 400 meters. Regardless, the fracture line would most likely have been present on the USA/Canada border. We have one more avalanche event article, and then we will move into historic overviews of the people who founded our industry. The first in the series will be a profile of the first Avalanche Field Technician in Canada. Any guesses who that is???

History Series; Chilkoot Pass Avalanche By Frank Norris

The deadliest event of the Klondike gold rush occurred on April 3 1898, between Sheep Camp and the Scales on the Chilkoot Trail. Numerous snow slides took place on that day. Five slides directly involved stampeders and three resulted in the loss of life. Another slide the following day took the lives of two others.[1] Altogether over 65 lives were probably lost. Many wealth of the gold fields. Scores of stampeders wrote about the event, whether they were close to the scene or not. The story of the snow slide is one that details the spread of information and rumor as much as it chronicles the event. The following compilation, taken from some of the available literature attempts to detail those aspects of the snow slide that most directly affect present-day resources.

south created unstable conditions. It then began to snow again. Veterans of the trail both white and Native, were aware of the danger of avalanches. Natives refused to pack above Sheep Camp and white packers warned others against entering the slide-prone area.

A few stampeders however, ignored their warnings and made plans to carry their goods up the trail.[4]

other snow slides took place on the Chilkoot Trail during the gold rush, but relatively few endangered the lives of stampeders.[2]

The Palm Sunday avalanche was one of the most widely reported events of the gold rush. Coverage of the disaster was probably second only to the initial news proclaiming the

The conditions that caused these avalanches were typical of those creating avalanches anywhere. The upper reaches of the Chilkoot Trail experience many avalanches each year, and spring is a common time for them.[3] Heavy snow had fallen on the higher slopes during February and March 1898, but on the first two days of April warm winds from the

On the night of April 2, avalanches began to tumble down the slopes above the Scales. Around 2:00 the next morning one of the slides buried twenty stampeders in the Scales area, another one at about 9:30, buried three others.[5] All of these people were rescued, but the roar of addi tional snow slides convinced

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the entire Scales population to evacuate along with a number of construction workers for the Chilkoot Railroad and Transport Company who had been on the top of Chilkoot Pass. Some 220 people began to descend toward Sheep Camp.[6] Workmen for the tramway went first; the remainder left the Scales between 10:45 and 11:00 a.m.[7] At the time of the mass descent it was snowing heavily and visibility was cut almost to zero.[8]

Between 10:00 a.m. and noon, three fatal snow slides cascaded down from the eastern escarpment.[9] The first slide took place at Squaw Hill, which was north of Stone House but south of the Alaska Railroad and Transportation Company powerhouse. Three campers were crushed to death in their tents. An ox named Marc Hanna was enveloped in snow but despite his burial several feet under the top of the slide the ox was unhurt. After being extricated he was put to work hauling the bodies of slide victims down to Dyea.[10]

Sometime later, a party of CR&T Company construction workers came down the trail from the Scales. As they were passing through a narrow gorge near the AR&T powerhouse a second avalanche buried and killed the entire party. This avalanche probably occurred on a cut-off trail (an alternate to the regular Chilkoot Trail) that followed along the east side of "drow-a-low" ravine, located east about 800 feet north of the AR&T powerhouse.

There is some confusion regarding how the construction men got to this area. One source based on eyewitness accounts, claims that the group headed north from Sheep Camp at 8 a.m. and were engulfed by the slide as they headed north. More reliable sources stated that the crew headed down from the summit in the mid-morning, and were killed as they hiked south. Either way they went, the low visibility may have caused them to wander off the main path.[11]

The largest and most destructive slide came soon afterwards. The main party from the Scales followed in the footsteps of the construction crew. The entire group of 200-odd stampeders, together with several dogs, marched in a long sinuous line. Due to the low visibility they were kept together by a 200-foot-long rope given to them by the construction crew. This rope had previously been used to haul freight from the Scales up to the summit of Chilkoot Pass. The group descending toward Sheep Camp lined up on alternate sides of the rope. Shovels were the groups only known luggage.[12]

Following the path of the construction crew the party left the main trail about 1000 feet below the Scales, angled left, and entered "drow-a-low" ravine sometime between 11:00 a.m. and noon.[13] They were unaware of the fate of the construction crew and could barely make out their tracks in the swirling snowstorm. About a third of the party had entered the upper end of the ravine when the mountainside again gave way.

Those in the rear of the party were untouched, but those holding the front end of the rope were buried, some to a depth of between twenty and fifty feet. The entire slide area was about ten acres, and about 150 yards of the cut-off trail was affected.[14] The avalanche was accompanied by a "fearful rush" of wind from the east. The recent heavy snow, the warming trend and the impact of the closely spaced people traversing the fragile snow pack, triggered this snow slide and the one which had descended upon the construction crew. Unlike some avalanches, this one carried no trees, stones or ice. In addition to the people

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it swept away, it engulfed many provisions which had been cached along its path.[15]

The roar of the third avalanche, much louder than those before, could be heard all the way to Sheep Camp. The camp was alarmed by the ominous rumble, but its residents had no way of knowing if any stampeders had been involved. Soon an eyewitness to the event --possibly one of those that had been holding the rear portion of the rope -- staggered into camp bearing news of the disaster. Guns were fired to summon help, and fifteen hundred stampeders responded.[16] Within minutes they headed up the trail. They probably arrived at the site of the slide within the hour.They joined those who had been unhurt by the slide, or those who had dug themselves out in the rescue operations.[17]

Rescue operations continued for the next four days and traffic over the trail halted. Rescuers attempted to save as many lives as possible. Estimates varied as to the number of lives that were saved. Edwin M. Wold noted that "only one or two persons were taken out alive." The New York Times however, noted that 25 had been rescued, and the Dyea Press claimed that 40 or 50 were pulled from the snow pack because they held onto the communal rope. Even more extreme was William Hunt's assertion that "frantic rescuers pulled over 100 men to safety." A compilation of accounts appears to indicate that at least ten people who were initially buried by the snow pack were dug out alive. At least four of those however, later died of exposure.[18]

The number that died in the snow slide is even more open to conjecture than the number who were saved. At first, wild reports were circulated that two or three hundred lives were lost.[19] After the rescue process began more modest estimates were made, and several lists of the dead were compiled. Four different lists, each appearing in different publications were known to be produced. The number of names on the four lists was 48, 51, 65 and 70. Significantly few names appear on all four lists. The sources for these lists are not known, and because almost no biographical information is known about the large majority of the victims, there is no practical way to verify the authenticity of the various lists. A fifth list of names appears on the headboards at Dyea's Slide Cemetery. Because many remains were shipped outside for burial, this list is not complete. It is significant however, that several of the names on those headboards do not match those found on any of the published lists.[20]

Contemporary accounts including diaries of the stampeders give diverse estimates of the number of dead. The following accounts are listed in the ascending order of the estimates made. Inga Kolloon writing from Sheep Camp, noted that 39 victims had been counted on the day of the slide. However, she made no further notes on this subject. The Dyea Trail in its April 9th (Saturday) edition reported that 48 bodies had been taken out by press time. Harley Tuck who was in Wrangell at the time of the slide, claimed that 52 lives were lost. Andrew Nerland, like Kolloon was also staying at Sheep Camp when the avalanche hit noted that "14 dead were found on Sunday, 23 on Monday, 7 on Tuesday and 9 on Wednesday [for a total of 53]. I do not know whether any have been found today, but twenty are still said to be missing." The various diarists in the Monitor party of stampeders stated that 38 bodies had been taken out by Monday, 53 by Wednesday and 54 by Thursday.[21]

Others made higher estimates. Stampeder Robert Graham noted that 18 bodies had been removed by Sunday afternoon, and by Wednesday 60 bodies

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had been recovered. J.W. Patterson of Dyea, who built many coffins for the victims notes that 47 bodies had been taken out by Tuesday afternoon, 60 by Thursday and 61 by the following Sunday. Mary Lee Davis reported in her diary that over 70 had been killed, but she later revised her estimate. She noted that 54 bodies were found within the first few days after the avalanche, and seven more were located after the winter's snows had melted.[22] Edward Banon reported that 63 bodies were taken out, and NWMP officer George Pringle claimed that 64 died. Finally, young Paul Mizony noted that "about 67 bodies" were recovered in the days immediately following the slide. Three recently discovered victims—perhaps among the seven noted by Mary Lee Davis—were reported by Martha Black, who passed through Sheep Camp in July 1898.[23]

The reason that the number and identity of the victims is so inconsistent lies in the transient nature of the stampeders, the inefficiency in the burial process, and the physical difficulty in accounting for all the victims. In a rare display of unanimity and selflessness, the stampeders abandoned their collective trek in order to rescue and locate snow slide victims. A tent in Sheep Camp was donated for use as a morgue, and the local Citizens' Committee appointed at a miners' meeting, officially presided over the processing of the bodies for shipment and burial.[24] Eyewitness accounts indicate that most or all of the victims were identified and claimed, and death certificates were issued. The Dyea Trail assured its readers that "a complete record of all transactions were kept. A list of the principal effects found on a number of the bodies, and a record of the Committee's work will be filed with the United States Commissioner's office at Dyea."[25]

Reports indicate however, that the identification and burial process was flawed. One story noted that con-man "Soapy" Smith had himself appointed coroner. Before Mounted Police officers could intervene many of Smith's gang members had stripped the bodies of cash, jewelry and other valuables.[26] No existing records from the Commissioner's office show either the death certificates or the lists of the victims' personal effects. Based upon these discrepancies, it is unlikely that the number or identity of those killed will ever be known.

There is also confusion regarding which bodies were sent south and which were buried locally. One list of the dead claimed that 22 were buried in Dyea and 29 outside. C.L. Andrews however, noted that 23 were buried in Dyea, and J.W. Patterson who helped bury the victims in Dyea, noted that 26 had been laid to rest there by April 10.[27] In 1979, the Slide Cemetery exhibited 35 headboards with an April 3 1898 date of death; in addition, there were ten unmarked or illegible headboards. Complicating the location of graves in Dyea is a report suggesting that the few victims which remained unidentified were placed in a common grave.[28]

The Slide Cemetery near Dyea is the major existing landmark for the Palm Sunday snow slide. The site of the slide itself is marked only by a nearby interpretive sign. The marker is located along the recreational trail and is thus away from the site of the slide, and is south instead of north of the powerhouse remains. The ravine where the slide took place has not been specifically located or marked.

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Check out page 53 of the Newsletter for Klondike Capers

Minutes of the Annual General Meeting - May 07,1998

President Niko Weis called the meeting to order and welcomed the members. Announcements were made and the rules of order briefly reviewed. The President then introduced the Board of Directors.

PRESIDENT'S REPORT - Niko Weis

Niko reviewed the past difficult season, highlighting the fact that the Association and Centre rose to the challenge through vision, leadership, collaboration and dedication, not to mention a lot of hard work. The results have seen a major reorganization, high expenditures on new technology, greater efficiency, increased credibility, successful projects, partnerships, funding, research chairs, and the Centre being voted as the top high tech office in Revelstoke. Our emerging national responsibility will hopefully help us to establish a non-profit public donation foundation. The directors are working toward 3 major themes for the future: 1. To increase and maintain member contribution, direction and participation in the future of the CAA. 2. Search out funding and financial support of our public programs. 3. The formal establishment of external relations with government, industry and the media. In conclusion, Niko announced the resignation of Managing Director, Alan Dennis and paid tribute to his dedication and hard work on the Association's behalf for the past 7 years.

FINANCIAL REPORT - Bruce Allen

Bruce Allen presented the Treasurer's Report using an overhead presentation. Members' equity is $288,723.00. Although a drop from last year, Bruce elaborated and reported that we are doing well for a non-profit organization.
Highlights and discussion focussed on:

Infoex	surplus reinvested into technology	$ 6,135
CAATS	paying previous bills, many cancellations/full refunds	(12,617)
CAA		(8,589)
Public Safety Services		(8,358)
Avalanche Rescue Video		(179)
Training Manual		(35)
Continued Professional Development		(3,287)
Avalanche Accidents Vol. 4 Project/NSS		(10,418)
ECAP (Eastern Canada Avalanche Project) NSS		(2,345)
RAC (Recreational Avalanche Course Project)		584
	Sub Total	$ 21,931
	Interest Income	3,855
	Excess of expenditure over revenue	$(18,076)
	Surplus, beginning of year	267,788
	Surplus, end of year	$249,702

Complete financial statements were available at the meeting and Bruce went over the basic infor-

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mation and entertained questions from the floor. Explained that Instructor fees are up and the Schools Coordinators wages and some of the previous years were included under CAATS that should have been reported elsewhere.

Moved by Chris Stetham and seconded by Buck Corrigan that the financial report be accepted as presented. Motion carried.

Bruce then presented the Budget for 98-99. We will be looking for a balanced budget in all disciplines except Public Safety and will be raising course fees. Hoping for a $12,050 surplus and the cash reserves replacement will be hopefully $8700. Bottom line of this budget is to use money for member's advantage – no good in bank. Over $800,000 going through the Centre, a lot of work. Question from the floor on Budget: what constitutes member's equity in report? It represents cash in the bank plus everything we own plus what is owed to us.

Moved by Bruce Jamieson and seconded by John Hetherington that the budget for 98-99 be approved. Motion carried.

CAA/CAC MANAGING DIRECTOR'S REPORT - Alan Dennis

Alan circulated hardcopies of the report he presented at the Public and Technical Meeting.

COMMITTEE REPORTS:

MEMBERSHIP COMMITTEE REPORT - Diny Harrison

It was a learning year and her overhead presentation included a listing of membership figures showing an increase. RAC program generated a number of the new associate memberships. Diny welcomed them all.

Proposed changes to the Constitution highlighted. Active to Professional member will be automatic if approved. The other change is the new position of Affiliate Member and this is an individual involved in avalanche activities on a part-time capacity and has a Level I. This accommodates teachers in the avalanche field and American Avalanche Professionals. We should see an increase in American memberships. Question from the floor: what is difference between Assoc and Affil members.

Diny elaborated on voting rights of affiliate members – only professionals have voting rights and the other 2 categories vote through their professional representative. Associate memberships are for groups or organizations. Question re Article 9B from Dave McClung: is one letter from a professional enough? Discussion followed.

A motion was proposed by Dave McClung that Article 9B be amended to included at least 2 letters from professional members recommending the application. Seconded by Phil Hein. Show of hands that the proposed changes be accepted. Approved 69/Opposed 0. - passed Affiliate members will be represented on Board of Directors once more join. (only 2 as of AGM)

EDUCATION COMMITTEE REPORT - Phil Hein

Phil introduced the Education Committee. Randy Stevens ran RAC project and achieved great success. Colani Bezzola is looking after the CPD program and Peter Schaerer led the committee as Chairman.

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Highlights on the resources of the Centre. There were 18 courses last winter, 15 courses were scheduled and we added 3 overflow. T&I - 16 students; Lev. I Ski Op - 275 students, Snowmobile Lev I - 11 students, Lev II - 45 students. Only two Lev. II courses next year so sign up early in September. There were 55 instructors on the roster and 348 students this past season. Future looks bright. Needs to hear more from Industry as to the skill level they require. Phil revisited an industry wide survey undertaken in 1995. It highlighted skill-sets determined by various industry groups with terrain and route selection skills having the highest requirements along with snow observations and stability evaluation components. Course fees will be increased somewhat as industry support for running the courses has declined over the years. They are looking for new instructors and looking at having two visiting instructors funded by their employer. Niko highlighted Randy Stevens special contribution to the RAC project. It is an outstanding success financially etc.

EXPLOSIVES COMMITTEE REPORT - Mike Boissonneault

Reiterated highlights from Technical Meeting presentation. New and improved X381 and X382 fuse introduced onto the market this winter. X381 had 12 problems and was reported on Infoex. Fuses popped and flared and correction will be pursued. New cost of $8.50 (up from $2.50) reflects higher quality. He is still trying to get 2-hour restrictions lowered. The onus is clearly on the distributor and manufacturer to make the users aware of regulations in regard to the 2-hour wait on some fuses. Working with WCB on a proposal to designate CAA trainers to do explosive teaching. Blasting guidelines need to be polished and will be working on that. Question: our relationship with WCB board – there seems to be an unprofessional attitude in some of their representatives. Niko congratulated the Explosives Committee for their contributions to the industry.

TECHNICAL COMMITTEE REPORT - Dave McClung

Committee's mandate is to give guidance on technical matters to Association. There were several items on the agenda this past year that no progress was made on, such items as the video on standards in Canada and the question of the ABS balloon in heliskiing in Canada. In the future they will be completing the review of the Munter book and are looking for other projects that are of a concern to the membership. Overall it has been a quiet year other than the ABS balloon. Question: Have we looked at the Dave Lind book, U of Colorado. Dave will get in touch with him.

CPD COMMITTEE REPORT - Jack Bennetto

If we claim ourselves as professional members then it is required that we maintain our continued professional development. Jack gave background on why CPD was required and developed and how it will be implemented. A budget has been developed and will eventually be user funded. A review of the process was demonstrated on slides and handouts are available.

Moved by Buck Corrigan and seconded by George Field that the CPD program be accepted. Approved.

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ASSOCIATE MEMBERS REPORT - Dan MacDonald

Dan said that the members have just made a very important step in becoming professionals. They have just secured their future and their earning capabilities. Engineers could have claimed their work as the experts/professionals. The members are the experts now and will continue to gain power. The solution to a very serious problem has been resolved.

The Associate Members meeting had 15 attendees yesterday. Dan introduced our new director Gord Ritchie who will be a valuable asset bringing strategic planning as a very strong point. Financial management of the association has seen a lot of progress in the past 2 years. Evan Manners and a new bookkeeper with computer skills. Evans understanding of cash flow is a huge asset. The progress has been phenomenal. The mandate of the association has been to employ the cashflow to do good work. Management of Centre and members equity in good hands. He paid tribute to Alan Dennis, highlighting all his good work and it has been greatly appreciated. In conclusion, with the CPD issue resolved the members now have power and are in the professional class.

Announcing his retirement from the Board, Dan made several reflections of his tenure as being an enriching experience. He is grateful for those brought him onboard, delighted in watching the growth of many of his peers and has great admiration for those who taught him. He is still looking forward to watching the future growth of the Association.

Niko, on behalf of all, paid tribute to retiring Director Dan MacDonald for his many contributions to our organization particularly in financial management, vision, and our future direction.

ALBERTA AUDITORS REPORT - George Field

Auditors signed and all went well.

AMERICAN ASSOCIATION OF AVALANCHE PROFESSIONALS REPORT - by Chris Landry

He is now the Strategic Planner of the AAAP. Chris summarized their year's activities and appreciated the CAA representation and participation at their meeting. Their meeting highlighted their initial study of explosives and it was at this meeting that he was appointed Strategic Planner to help develop their association. He will be reporting to the ISSW board next fall. They have spent a great deal of time addressing the explosive issue. Check the web for information through the AAAP web address (www.avalanche.org). They enjoyed a significant growth in membership last year. The Avalanche Review is their primary publication.

ELECTIONS:

Chris Stetham, chairman of the nomination committee assumed the chair. He explained how representation on the board covered a mix of geographic and professional areas.

Results of nominations and elections of officers as follows:

President	Niko Weis	acclamation
Vice President	Marc Ledwidge	"

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Secretary/Treasurer	Bruce Allen	"
Membership	Diny Harrison	"
Associate Director	Gord Ritchie	
Director-at-Large	Bob Sayer	acclamation
	Bill Mark	"
Alberta Auditors	George Field	"
	Peter Amman	"
Committees:		
Membership	Diny Harrison	"
	Assisted by George Field, AB and Rob Siggers, BC	

NEW BUSINESS:

Chris Stethem acknowledged Alan Dennis's service to the Association and made a motion that he be made an honorary member. Seconded by Jack Bennetto. Approved.
Moved by Chris Stethem that the CPD records be kept as confidential paper copies only and not on a database in the Centre and that a separate document of the CPD points category be sent out with the annual dues submission and the returned submissions to be confidential and available to the Membership Committee only. Seconded by Jack Bennetto. Approved.

CORONERS INITIATIVE REPORT - Bruce Allen
Reviewed his slide/overhead presentation that was presented at their meeting which resulted in a proposed Letter of Understanding/agreement to be signed between the CAA and the BC Coroners Service. Another result is the development of the Coroners List of our members who are willing and trained to assist the Coroners Service in their investigations. Bruce then proceeded to explain what is recommended and required from our members doing an investigation. Handouts were distributed and Bruce invited people to write to him with recommendations and comments for inclusion in the final agreement. Along with this document, we will propose that we be given complete authority over on-site rescue operation decisions.

Niko – Media Pre-org Seminar. Next Fall a one day session to include 5 sponsored members and the centre staff and anyone else that wishes to attend on their own. Niko asked interested persons to contact the CACentre.

It was decided after a discussion on rotation of location for the AGM and a show of hands, that the directors would have to make a decision as to where next years annual meetings would be held probably on May 5,6,7th 1999. The meeting was adjourned at 1250 hrs. 86 members signed the attendance sheet. Minutes edited by Bruce Allen, Sect/Treas-CAA.

Minutes of the Public and Technical Meeting -Part 1- May 06, 1998

The meeting was called to order by **Chairman Bruce Allen** who welcomed the delegation and outlined the afternoon's agenda. The Chairman encouraged the membership to meet the Centre's staff and interact with the Associate Members at their displays.

CAC REPORT - Alan Dennis
Alan reported on the extraordinary number of avalanche fatalities that started in early November. Using a slide presentation, he showed the vast area of avalanche locations, highlighting one of the most northerly ones. The figures were Canada 20; USA 21; France 30; Switzerland 11. Our Bulletins posted the same ratings as in previous years, noting that 6 fatalities happened during high ratings and the increase in snowmobile fatalities. There was a great increase in Bulletin and Infoex usage. Revenue increased and costs have leveled off. Alan reviewed the CAC restructure. NSS/NIF Projects were also summarized from 1991 - 1998. Alan then introduced Per Nilsen, acting chief, Resource Management, Parks Canada.

NATIONAL PARKS CANADA - Per Nilsen
Per acknowledged Clair Israelson for managing Western Canada Parks public safety work at the field level. Recapped his department's interest and work in national issues of geographic distribution of avalanches in several other areas in Canada besides Western Canada; the national transportation corridors and the effect or potential effect on citizens of all regions and visitors. Public Safety is viewed as a shared responsibility and high priority is given on prevention initiatives through Parks and NSS and other partners. Programs need to focus on youth and greater support of field units is needed. There is a need to create strategic alliances with experts in the field such as with the CAA. The results of previous alliances established numerous NIF projects such as the RAC and ECAP projects. It is hoped that in the future we continue to work together placing high priority on Prevention Projects, with Parks acting as sponsor for worthy NIF projects.

Niko Weis presented **Gord Ritchie** with a signed copy of The Avalanche Handbook in recognition of his many years of outstanding work on behalf of the CAA community.

CANADIAN SKI PATROL SYSTEMS - Peter Spear
Reported on how the high school program in Alberta started after the tragic deaths of four young people in November 1997. SMARTRISK sat in on their first meeting and the Beating The Odds video was used in the presentations and proved to be a great attention getter. The SmartRisk stupid line campain was used in the presentation along with many handouts and Internet addresses. This program reached 3000 students.

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The future goal is to work with the CAA and put this program into all high schools of Alberta and BC. The four goals are to:

1. Establish an avalanche safety program as a permanent curriculum.
2. Create 1 hr package for teachers.
3. Create a video or computer package.
4. Generate funding.

The goals are intended to make it possible for high school students to earn a credit. The next step is to focus on all high school students and not lose momentum and to encourage and meet the demands of RAC courses. SNOWRISK is now a new catchy phrase that will entice teenagers to approach avalanche safety as cool. A six-page proposal is available to take home for those interested.

Questions: BC process, what has been done - Alan Dennis has approached our minister of education – Initial reply not satisfactory but latest reply indicates that they will look at being involved.

SMARTRISK FOUNDATION - Dr. Robert Conn

Thanked Alan Dennis and Per Nilsen for making it possible for him to come. Gave background to becoming a Heart Transplant Surgeon and then into his present field. When he became aware where the donor hearts were coming from, he realized that more people under the age 20 were dying due to accidents. After gathering statistics on injuries he decided that our health care bill would be better spent on prevention. Accidents are thought of as acts of faith – not as consequences to stupid risks or conscious choices. It also has to do with negative messages involving safety – not cool. The challenge is to readjust attitude to make people think about crossing the Stupid Line. There was a big change in attitudes towards fitness, environment and smoking using media messages, so they decided to focus on youth and put together a road show for them. To date, the show has reached 650,000 youth. He researched how to reach the young people using the things that are important to them, such as music, dance and body image. Gaining their attention not by scare tactics but by emotional information. Presenting 5 simple messages: buckle up, drive sober, look first, wear the gear, and get trained. Reinforce the 5 messages and address peer pressure. Life is about taking risks so utilize taking smart risk. Three steps: 1. Be aware. 2. Evaluate. 3. Making the right choice. Excited with alliance with CSPS and CAA. Is trying to create a social movement and is very excited about it and convinced that people will begin to demand the skills that reduce risk. People will move from thinking that accidents just happen to accepting that they are predictable and preventable.

3 steps will happen
1. Huge demand for Education such as RAC courses
2. Demands for more safety equipment
3. Public policy makes more practical sense

CANADA WEST SKI AREAS ASSOCIATION - Jimmy Spencer

The association works very closely with CAA in particular Alan Dennis. His stakeholders hold a 50-year legal tender on land and pay the government a percentage of revenues. Highlighted responsibilities within ski areas. Safety or management of risk and avalanche control plays a great

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part. Obligated to maintain and train ski patrols. The association is moving away from volunteers to trained patrols. And from the liability point of view, they have to carry a hefty amount of insurance. Meetings twice a year, trade show, and also seminars. Education obligation – summer months puts on frontline training. Marketing, public relations. Praised Dr. McClung's program. Safety is going to be reinforced all down the line. Standardization of signage now adapted. Examples presented for review. Incident forms standardized also. Statistics show that usage of ski areas up but accidents are down by a great percentage. Task forces created and came back with message that education of high school students critical. Need to seek sponsorships/alliances and cultivate media.

UBC RESEARCH PROJECT - Dr. Dave McClung

A lot of interruptions this year. Their research is proceeding and he summarized the interactions of avalanches and forest cover. A slide presentation focused on Avalanche Activity in Forested and Harvested Terrain.

ASARC - Dr. Bruce Jamieson

Bruce gave an overview of the Avalanche Research Seminar that is to be held on Saturday. He elaborated on their name change, it now being the Applied Snow Avalanche Research Consortium (ASARC), and gave details regarding the people involved and the range of work covered. Executive study highlights: a) 3 hole probe. Highest probability of finding.
b) Snowpack Characteristics
c) Contrasting the Facet Layers of Nov 96 and 97. Dramatic differences in facet layers and crust but seasonal snow falls were equivalent.

SPECIAL PRESENTATION - Niko Weis

The president made a special presentation to **Colin Johnson** on the occasion of his retirement at the University of Calgary and in recognition of all his hard work, dedication and contribution to the CAA. A plaque was presented in appreciation. Colin reminisced about the physical and fieldwork, humble beginnings, the people, the co-operation of the snow industry and the great times.

TRANSCEIVERS - Nic Seaton

Nic gave a report on the Tracker DTS. The digital transceiver came on the market this winter. They tested differences and benefits as opposed to analogue. Using slides, Nic demonstrated how it is used, highlighting its high tech and drawbacks and reported on some of the suggestions that were made to the manufacturer on some improvements.

Conclusion: Compatibility is the major problem. Confusion could seriously affect outcome of rescue. Need to implicate a set of standards in European and NA manufacturing. If our industry needs this compatibility problem fixed then we have to decide how best to achieve the changes in universal standards of manufacturing so that there is compatibility amongst all transceivers, analogue and digital. Bob Sayer added his test results that backed Nic's work and also added

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some variations. It was also noted that the transmit/receive button could be easily disturbed.

Three new digital beacons are due for release soon. The manufacturer rep reported that this beacon was primarily designed for easy use by the general public not necessarily for the professionals.

EXPLOSIVES COMMITTEE REPORT - Mike Boissonneault
Acknowledged other participants on the committee and support from other companies. Spoke briefly on the winter's incidents, new fuses, WCB regulations impact, and introduced the industry rep from Calgary. There was an **ICI Explosives'** overhead presentation on fuse testing. There were only 12 problems with fuses this year and it was the best year at only .001 problem rate. X382 will be used next year. The 2 hour time wait may be reduced, watch Avalanche News for updates.
George Hepkey of Natural Resources gave a brief presentation on his role as an explosives specialist. He highlighted the differences between the Canadian and the new Mexican fuse from an open 8x8 weave to a 10x10 more concentrated weave. This new wrap accounts for more abnormal venting. He also recommended to get rid of any Brazilian Manstart fuses.
Gary Kreiller, WCB, gave report on Blasting Regulations. New WCB regulations 21.79 states: **"Re-lighting a safety fuse is prohibited"**. He explained that WCB always goes with the Manufacturers recommendations so you may still have 2 chances to re-light if you follow the manufacturer's recommendations.
Misfires: new reg 21.78 states: **If a misfired charge contains a safety fuse and is re-blasted, workers must not return to the blast site for 30 minutes after the detonation**.
Question to WCB regarding why some explosives require 2-hour wait after misfire. It was explained that some are designated as High Explosives and the industry is working towards correcting the failure rate.
The meeting was also reminded to call the supplier if no information accompanied their order. They are working towards the CAA designing their own training course.

AAAP – AMERICAN ASSOCIATION OF AVALANCHE PROFESSIONALS - Hal Boyne
Their association has now hired an executive director. Membership is up to 265. Two main concerns are to work towards explosive standards and for their Education Committee, reviving the guidelines for avalanche courses and in particular courses for professionals.

Door Prizes: donated by **Gary Walton, SEAR** won by Tim Auger - saw
Robin Dalinghaus - ruler

Bruce Allen reminded the members of the CPD meeting at 1900 and invited all to attend. Reiterated tomorrow's events.

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Minutes of the Public and Technical Meeting- Part II- May 07, 1998

The meeting was convened by **Chairman Dan MacDonald** who welcomed the delegation and outlined the afternoon's agenda.

MUNTER BOOK TRANSLATION - Peter Schaerer
Translation into English is being completed. Expounded on Munter's experience, his inventions and qualifications for writing such a book. The book contains regularly published material that is available anywhere but it also contains a core of new material in the form of his 3x3 formula that he developed. His decision making formula method allows the inexperienced traveler to use the reduction factors to assess the risk. The attraction of the use of this formula method makes it easy for the inexperienced. In conclusion, Peter states that the book provides much food for thought. However, a danger with books such as 3 x 3 Avalanches, which present a complex phenomena in an easy, comprehensible form, is that readers fall into the trap of believing that the evaluation of avalanche hazards is simple and requires only the application of a recipe. Munter himself says this is not so, but one needs to read the book in detail in order to appreciate the intricacies of avalanche hazard evaluation. General questions and comments followed.

VIDEO FOR SNOWMOBILERS - presented by Doug Abromeit
Doug showed his very powerful video that gives snowmobilers avalanche awareness skills.

UBC WEATHER GROUP - Roland Stull and Josh Hacker
Handouts were distributed. Traditional weather forecasts are very complicated and they rely on computers. The weather forecasts in the west are the worst due to lack of upstream data in the Pacific Ocean, so in effect it could affect our avalanche forecasts. The UBC Weather Group make their own forecasts. He explained their process in getting a more accurate forecast by focusing on western Canada. He described how they could benefit our members. Versatile forecasting potential. Visit their web page for more information (http://spirit.geog.ubc.ca/wxfest). He invited discussion after the meeting.

USA AVALANCHE ACCIDENTS - Steve Conger
Three regional forecasters from the States present at the meetings. Reviewed the fatalities over the past year. It was noted that over half of the fatalities involved snowmobilers. hanges in the last 2 decades showed an increase in fatalities from the 80's to the 90's. Education in Colorado brought their fatality rate down. The conclusion is that usage is up, skier's education has increased, but other groups have not taken up the education as of yet.

CANADIAN AVALANCHE INCIDENTS - George Field, Nic Seaton, and John Buffery
With a slide presentation, **George Field** gave a comprehensive report on the Fortress Mountain Incident where 4 teenagers lost their lives in an avalanche. The legacy of this tragedy is that

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some of the families are working with SMARTRISK, Peter Speer, George Field and Gord Ritchie in the promotion of high school avalanche awareness programs.

Nic Seaton reported on the incident 100 km east of Quesnel on Round Top Mountain near Wells on Jan. 31, involving one snowmobiler in a group of 12. Partial burial, with helmet exposed and recovery method was visual and took 30 minutes. Transceivers were left on the dashboard of the pick-up truck. The group was engaged in high- marking. Victim died of suffocation.

John Buffery reported on the Kokanee Provincial Park incident of January 2, 1998. Six people involved and no one survived and there were no witnesses. He reviewed course of recovery and investigation. Because of the instability, explosives were placed in order to facilitate recovery. Once in the area the first recovery took only 6 minutes. It was also noted that one of the victims had attempted to recover a friend and then died of his own trauma wounds. All of the victims suffered severe trauma. It is speculated that the avalanche was remotely triggered.

ABS BALLOON - John Tweedy
The balloon has been around for at least 15 years in various designs. It is a German invention. After a request by Klondike Heliskiing it was decided to review their data that was gathered from their tests. There are some very significant issues in regards to the balloon in heliskiing. Transport Canada has a problem with the fact that it may go off in the helicopter plus the fact that it has a pressurized canister. The main concern is does it improve the chances of survival versus the problems and the fact that the helicopter regulations may deny its use. Attitudes of the skiers may change because they may feel more secure with this device. Unfortunately there was no representation from Klondike Heliskiing to review more of their data. There were 2 survivals in Europe wearing the device this past winter. Technical Committee is making no recommendations on this device.

ALBERTA SNOWMOBILE ASSOCIATION - Darcy Svederus
One of the biggest problems for his association is the fact that snowmobilers are hesitant to spend the money on safety and avalanche awareness education. Even though they spend thousands of dollars on their machines many use the excuse that they do not want to add weight to their sleds from safety equipment. It is a very frustrating problem. Using a slide presentation, Darcy showed what types of snowmobile activities caused incidents. In conclusion he felt that snowmobilers need more education and it is encouraging that more snowmobilers are now taking the courses. In closing he thanked Alan Dennis for helping him become aware.

The meeting concluded at 1730 hrs with a reminder to the membership of the RAC and Infoex meetings scheduled for the evening.

Canadian Avalanche Association Training Schools / CAATS

Winter Season 1997-98 Training Schools Report by Phil Hein

This past winter season, 18 CAATS Level 1 & 2 Technical/Professional courses were held in Alberta and BC. Six locations in BC and two in Alberta were used to conduct the courses. Many of these locations have become standard course venues over the years.

A total of 348 students participated on the courses, leveling off from last year's total of 343. During the previous two years, the courses experienced increases of nearly 50 students each season, close to 20%.

Of the 348 this season, 337 passed the courses. The breakdown of courses were:

- Ski Operations Level 1 - 13 courses / 275 students
- Transportation and Industry Level 1 – 1 course / 16 students
- Snowmobile Operations – 1 course / 11 students
- Operations Level 2 – 3 courses / 45 students.

Participation this Season:
The level of registration and participation appears to have been partly affected by the low snowpack levels experienced early in the season, and incidentally, by reports that fatalities including the early January incidents may have lead to cancelled registrations and a reduced number of applicants. Also of influence no doubt, was that it was recommended and encouraged that persons interested in taking CAATS courses should have previous introductory avalanche training or Recreational Avalanche Course (RAC) training prior to the Level 1 technical courses.

Registration Requirements for 1998-99:
For next season, provision of RAC training participation details or an acceptable resume of previous introductory training will be required from applicants, acknowledging their general avalanche training and appropriate backcountry touring experience. Applicants may be declined registration without sufficiently documented experience. The goals of the technical level program requires that participants training in operational work must already be proficient travelers in the mountain environment. They must have sufficient previous avalanche experience, in order to develop effective skills in a week at the required technical level. This increases the level of material and activities that instructors can cover in the program during the course, and better insures that operational personnel meet industry requirements in their work performance.

CAATS Instructors:
There are currently 55 instructors formally involved with the program. With increasing growth in the Schools from 1991-96, the pool of instructors was increased to provide a large enough group to draw on, due to individual availability and logistics. One of the side affects of this approach was that many instructors worked on only one course per season, or sometimes every few seasons. This does not contribute towards higher standards of instructor development, nor increased course consistency, as when instructors are obviously involved in 2 or more courses each season. For these reasons, few new instructors have been taken on by CAATS during the past 3 seasons.

Instructors who have worked with CAATS over many years, and bring strong experience and skills to the program, are encouraged to commit to one or more courses every season. Ideally, experienced instructors who can commit to two or more courses are utilized whenever appropriate. Newer instructors most often work as the third instructor of a group,

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and are often chosen for the specific operational background they bring, to round out the team.

Future CAATS Instructors:
Many experienced CAA members have expressed an interest in teaching in the program over the last 2-3 years. With students numbers leveling off this past season and RAC training options increasing, the number of CAATS technical course participants may decrease over the next few years, and correspondingly the requirement for any increase in the number of instructors.

It is important that members interested in future work as a CAATS instructor remain current in their various areas of expertise, and work actively when possible as a RAC provider, further developing their communication and instructional skills. Overall, the need for avalanche training still appears to be on the increase, and the primary focus on provision and delivery of various training courses should be shifting towards specific recreational needs, with the development of the RAC Program. The CAATS Program will work on opportunities involving the existing CAATS-Instructional Techniques Training sessions held each fall, to offer their sessions to both CAATS and RAC Instructors together where possible. Please contact the CA-Centre if you would like your name added to the list to be advised of these opportunities.

Parks Canada Entrance Fees 1998

Great Western Pass:
(valid for entry to 11 national parks in Western Canada)

Individual
Adult $35.00
Senior $27.00
Child $18.00

Group (2-10 persons)
Adult $70.00
Senior $53.00

National Parks Day Pass:
Banff, Jasper, Yoho and Kootenay
(*Mt. Revelstoke and Glacier National Parks)

Individual
Adult $5.00 (*$4.00)
Senior $4.00 (*$3.00)
Child $2.50 (*$2.00)

Group (2-10 persons)
Adult $10.00
Senior $8.00

For more information on Park Passes phone:

1-800-748-PARK(7275)

Avalanche Research Gets A Chair

By Bruce Allen
Sec/Tres

Dave McClung, long time CAA member and a 1971 avalanche student (of Ed LaChappelle) at the University of Washington has been appointed by the University of British Columbia to the chair of the Avalanche Research group. Principal supporters of the chair are Canadian Mountain Holidays, Forest Renewal BC and the National Science and Research Engineering Council. The vice-president of research at UBC has been a strong supporter of this proposal.

This special professorship gives Dave the opportunity to concentrate his efforts to the applied research for industry. Two examples of current work are the investigations of the effect of avalanches on forest cover particularly harvested blocks and ongoing developments in avalanche forecasting processes.

After completing degree work Dave spent two years with the Norwegian Geotechnical Institute when their avalanche section was started. He then worked two years with Ron

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Perla and Peter Schaerer of Environment Canada and the National Research Council from 1977-1991.

We look forward to enjoying the benefits of the work. Congratulations and good luck on behalf of the executive and

What is a research chair?

A chair is a special research professorship devoted to the needs of the industries. Reduced teaching and administrative duties allows time to concentrate on research.

Avalanche Transceiver Contest

By Gord Ohm, Fernie Alpine Resort Pro Patrol

Throughout February and March of 1998 the A/C team in Fernie did some random surveys at their lateral boundary exit points to determine how many of their guests were heading out with transceivers on. The results showed that out of 140 people (over 5 days), roughly 36% were wearing beacons. Season pass holders were more likely to be wearing one than day ticket holders. How many of that 36% ever practice with their beacons? In an effort to stimulate awareness and encourage practice, we held our first annual transceiver contest on March 14, 1998.

Our format was as follows:

- First run – single buried beacon 30cm below the surface, fastest 5 times advanced to second round
- Second run – 2 buried beacons down 30 cm at same mock site – option to turn off or leave on first one found – time started at top of lift so contestant had to skate/push to site
- The contest was closed to avalanche professionals

There were 22 contestants. The winner was Forest Latimer, a snowboard/alpine/telemark instructor who scored 1:07 in the first round and 4:37 in the second, which included the one-minute skate to the site. He was using and Ortovox F-1 and received another one as his first place prize.
All 5 finalists were under 140 seconds in the first round. Two of them used Trackers and were on it in seconds, before beginning the fine search for another minute and a half.
Roughly half of the 22 people made the mistake of turning down too fast. It was amazing to see people standing right over the beacon, transceivers blaring, and then turn down a couple of notches and head off into lala land.

Our plan to encourage people to practice next season is to offer practice sessions to the public, when running them for our staff. We will also set a date early in the year for our contest '99 to increase awareness and encourage practice. Our friends at *The Guides Hut* in Fernie have promised another beacon for a prize. We are now starting to look for sponsorship. Anyone with a potential prize contribution (heli-ski day, outerwear, gear?) please contact us at Fernie Alpine Resort. (Fax) 250-423-7471.
If you would like to run a contest in their area/operation feel free to give us a call. We learned a lot last year and have some great ideas for this coming season.

EDUCATION – the push is on. This is one more way we plan to move forward in the realm of avalanche safety.

CPD UPDATE

A full CPD package of information and a disk of software that can be adjusted to suit individual needs, will be forwarded to each member with the next newsletter.

Continuing Professional Development Committee

Munter Book Review By Peter Schaerer

Werner Munter: 3 x 3 Lawinen; Entscheiden in kritischen Situationen (In German; translation of title: 3 x 3 Avalanches; to decide in critical situations). Agentur Pohl & Schellhammer; Hauptstrasse 36-38, 82467 Garmisch-Partenkirchen, Germany; 1997; 220 p.

The book is a handbook on avalanche safety in the back country with emphasis on decision making, and the author writes in his introduction: "The book applies in the first place to mountain guides, ski instructors, touring guides, youth and sport guides, as well as back country skiers, off-piste skiers, and snow boarders; concisely: to all those who must make in the terrain their own and responsible YES/NO decisions which may affect life and death."

Twelve of the eighteen chapters contain descriptions of the nature of avalanches, accident statistics, survival chances, safety measures, the metamorphism of snow, layering, stresses and strength of the snowpack, weather that influences the formation of avalanches, and common errors in snow stability evaluation. Although this information may be found in other avalanche books, Munter presents it in a conversational language and concise form which he supports with excellent illustrations, an appealing lay-out of the text and tables, and by highlighting the significant points. The extensive experience in mountaineering and the communication skill of Munter is evident not only in the presentation of technical information, but also in his philosophic comments about the joys of travel in the mountains and the inherent dangers. He contends that accidents can be reduced with the information which he presents, but cannot be eliminated.

The core of the book deals with the evaluation of avalanche hazards by applying the 3 x 3 formula. The formula incorporates three criteria that are viewed and filtered on three geographic levels. The three criteria, identical to the corners of the hazard triangle, are: weather and snow conditions, terrain, and human factors. They are examined in sequence for the region, local area, and specific slopes. For example, on the regional level the avalanche hazard is evaluated and initial decisions are made at home by taking into account the avalanche danger bulletin, weather forecast, a study of topographical maps, and the ability of the touring group. The next step of evaluation and filter for decisions takes place in the terrain, which Munter defines as the area visible by eye and binoculars, and includes observations of the snow conditions, local weather, terrain, and considerations of required travel time. On the lowest

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filter level, individual slopes are evaluated with respect to visible snow depositions; inclines, exposure, and nature of the terrain; previous ski tracks; and applied safety measures. The author explains the application of the 3 x 3 decision formula with examples of route planning.

For inexperienced travelers, Munter proposes the reduction method as a quick and quantitative technique for evaluating the hazard on individual slopes. According to Munter's definition, the residual hazard is a danger potential number divided by reduction factors, and the hazard is acceptable, when the residual hazard number is less than or equal to one.

The danger potential must be determined by assigning a numerical value between 1 and 12 to the level of the avalanche danger that is publicized for the region. The reduction factors must be selected from a list by taking into account for example, the incline of the steepest part of the slope, aspect, previous tracks, and size of the touring group. The values of reduction factors which Munter proposes, still must be confirmed by experience and may not necessarily be applicable to areas outside the European Alps.

It is important to note that the danger potential number, being the starting point for determining the residual hazard, relies on the regional snow stability evaluation and the avalanche danger bulletin. Central agencies having available networks of observation stations issue avalanche danger bulletins in Western Europe, but in Canada, ski areas, heliski and snowcat operations, and highway maintenance staff must determine the danger potential themselves for their own areas. This means that they must make and rely on their own observations of the weather, snowpack, avalanches, and stability tests. Operational persons may apply the reduction method only as an additional information when deciding whether or not a specific slope would be safe enough for use.

Munter draws special attention to the strong variation of snow stability within the same slope and warns against making conclusions about the stability of an individual slope on the base of one snow profile or one rutschblock test only. Actually, I find it hard to believe that anybody who is smart enough to observe and to interpret snow profiles would be dumb enough to rely on one exclusive profile when evaluating the snow stability.

The book provides much food for thought. A danger with books such as 3 x 3 Avalanches, which present a complex phenomena in an easy, comprehensible form, is that readers fall into the trap of believing that the evaluation of

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avalanche hazards is simple and requires only the application of a recipe. Munter himself says this is not so, but one needs to read the book in detail in order to appreciate the intricacies of avalanche hazard evaluation. It is recommended that readers study the book in full, be critical, and use the information complementary to other avalanche books and knowledge picked up in courses and by experience.

Important Notice


Fuse News

By Mike Boissonneault
Chairman of the Explosives Committee

I have recently been informed by Orica Canada Inc. (formally ICI Explosives) that the new X-382 Primafuse manufactured by Ensign Bickford (EB) includes a case insert notice with a statement indicating that it is ***not*** to be used for avalanche work. Apparently this notice has been prepared by officials from EB and in no way repre sents Orica Canada, who sup ply the detonator for this product. Although Orica has been aware of concerns EB has had about selling their products for use in avalanche programs, they were not aware of this restrictive notice until one was faxed to them in early June 1998.

I have been informed by Orica Canada that their attempt to have the restriction lifted against Canadian avalanche programs has failed. They also report that it was an oversight on EB that the notice not to use Primafuse (made in Mexico, X-382) for avalanche control was not included in last years fuse boxes. I have been informed that any Primafuse (even t though it may have been purchased last winter) can not be used. Orica will soon make these announcements and will offer to buy back any unused Primafuse from their customers.

Once again, the Mexican made Primafuse, X-382 is not a legal fuse for Cana dian avalanche programs.

In the meantime, I am working to find alternate suppliers of safety fuse assemblies so that we may have some options when placing orders in the future. Orica is also looking for alternate suppliers.

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I realize this is not great news. After years of working towards gaining access to better quality and safer fuse products, it is very frustrating to finally get there, then have a notice in the box stating "not for use in avalanche programs". It appears that we are the unfortunate victims of the legal system in the USA where anybody or any agency, (no matter how insignificant their involvement) gets named in law suites. Ensign Bickford is dealing with two legal cases as a result of the Bigsky fatality. As I am sure you are all aware, a ski patroller at the Bigsky ski resort in Montana was fatally injured when a hand charge detonated before it could be deployed.

As soon as there is a resolution to this issue or additional information, I will advise the Avalanche Centre in Revelstoke. I will also include an update in the next Newsletter. If necessary, I can be reached at (250) 387-7514.

New WCB Regulations

Workers' Compensation Board have introduced a revised set of WCB Regulations as of April 15, 1998. Agencies and individuals have until April 15, 1999 to comply with these new regs, however, the board would like compliance as soon as possible. Paul Orr (WCB Blasting Coordinator at the time the new regs were introduced) has requested that all avalanche control programs comply with the new regulations by the beginning of the next winter avalanche season. As many of you are aware, Paul Orr has been replaced as the WCB Blasting Coordinator by Gary Kreller.

I urge you to read the revised regulation pertaining to blasting operations thoroughly (book 3, part 21). In consideration of the new regulations it will necessary for all avalanche control programs to rewrite their avalanche control blasting procedures and re-submit them for approval to WCB (Gary Kreller) before next winter. Gary can be reached at:

Workers' Compensation
Board of British Columbia
South Okanagan/Kootenay
Region
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http://www.wcb.bc.ca

Avalanche Control Explosives Guidelines and Training Initiatives

I have received feedback over the past few years from CAA members that they would like to see specific avalanche control explosives training prior to writing (or re-writing) WCB Blasting Tickets. Much of the training offered by WCB refers to construction and mining applications with very little reference to use of explosives for specific avalanche control techniques.

By coincidence, while I was preparing a proposal that the CAA work with WCB to supply more applicable avalanche control explosives training for its members, I received a call from Paul Orr suggesting the very same. Although both the CAA and WCB have reached an agreement in principal on this issue, there are many details to work out. Meetings are scheduled this summer between WCB representatives and the Explosives Committee to discuss cooperative training programs for our members.

The CAA Explosives Committee would also like to revise and update the sections which describe specific procedures in the ***WCB Guidelines for Avalanche Control Blasting*** document. These guidelines were written in August 1995 and are due for revisions. Although each individual or agency who uses explosives for avalanche control may have slight variations, these generic

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procedures will identify the most important considerations for each procedure.

If you have any comments or suggestions regarding activities of the explosives committed please contact me at (250) 387-7514 or e-mail mboisson@vines.gems.gov.bc.ca.

Mike Boissonneault
Chair, Explosives Committee

Members: Bernie Protsch
Colani Bezzola

RAC NEWS

By Randy Stevens

This section of the Avalanche News is intened to provide information to RAC providers.

A meeting of RAC course providers was held in Penticton on May 7th 1998. The meeting was well attended by RAC course providers and other people interested in the RAC program. The meeting was very successful and the CAA would like to thank all those who attended.

The following is a brief summary of decisions made as a result of the spring RAC meeting:

- Correction of obvious errors in existing materials this summer.
- Develop an introduction overhead to display CAA logo and describe the relationship between the CAA and the course provider.
- Develop a set of size classification overheads, graphic representation of size for each size classification.
- Develop a course completion certificate. Course providers may use this certificate or develop their own.
- Arrange and advise instructional techniques training session for this fall.
- Update 35mm slide set to include images of snowmobile activities.

User Agreements:

- Develop a separate user agreement for providers of advanced RAC course.
- Add a statement to both introduction and advanced user agreements cautioning the course provider to investigate and follow any land use or licensing requirements.
- Add a requirement to provide a certificate of completion to both the introduction and advanced user agreements.
- Add a requirement for advanced course, course leaders to maintain practicing professional status with the CAA.

New Initiatives:

- Update of snowmobile manual
- Development of advanced course student manual.

Instruction Techniques Training for RAC Course Providers:

The CAA has been running instruction techniques training sessions for instructors involved in the technical schools programs for a number of years. These training sessions have proved to be very successful and significantly improved the quality of the technical schools program. **The skills obtained in these training sessions can also improve the participant's ability to conduct other types of presentations to employers or prospective client's etc.**

This fall the CAA will open these sessions to RAC course providers. Specific dates and course locations have not been finalized and will depend somewhat on interest. Training sessions are tentatively planned for late October or early November in the Vancouver or Whistler area as well

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as Calgary and possibly Revelstoke. Cost for the two day training session for RAC providers will be approximately $150.00 to $200.00 Travel and accommodation are not included in this cost.

Persons interested in attending one of these sessions are requested to contact the CAA in Revelstoke and indicate preferred dates and course location. Once we have a feel for the interest in these sessions we will contact those who have expressed interest with specific dates, locations and cost. If you have an Email address please include that with your expression of interest.

Contact the CAC in
Revelstoke,
phone: 250-837-2435
fax: 250-837-4624
Email: schools@avalanche.ca.

Look for the new updated Resource List in the fall edition of The Avalanche News.

Snowpack characteristics for skier triggering[1]

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Summary

During the winters of 1990-98, we gathered considerable data on skier-triggered dry slab avalanches. In this report, we contrast the snowpack characteristics from:

- 32 trigger points outside avalanche start zones (remotely triggered slabs and *whumpfs*),
- 82 start zones where skiers triggered dry slabs,
- 16 start zones triggered remotely by skiers, and
- 87 start zones that were skier-tested but not triggered.

At these sites, we observed snowpack depth, the load, depth and density of the slab, as well as the hardness, grain type, shear strength and age of the failure or weak layer. At a smaller number of sites we did rutschblock and compression tests.

To our knowledge, this is the first study to identify the snowpack properties of trigger points outside avalanche start zones. In contrast to skier-triggered start zones, trigger points outside start zones tend to have a relatively thin snowpack, and the failure layers are deeper, older and warmer than in skier-triggered start zones. In all 32 cases of remote triggering, we found the failure layer to consist of persistent grains (facets, depth hoar or surface hoar). We found depth hoar in the failure layers at 22% of remote trigger points but did not find it in the failure layers of skier-triggered start zones.

As an indication of how long layers of surface hoar, depth hoar and facets can persist in the snowpack, 25% of those triggered by skiers had been buried at least 13 days.

In the *Applications* section of the report, we use the results to make suggestions about route selection, regrouping sites, sites for snowpack observations, probing, ski-testing and avalanche control.

Although the data are from the Columbia Mountains, some of the results are relevant wherever people ski dry snow in avalanche terrain.

Introduction

In 1977, Perla published an article summarizing the dimen-

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ions of slab avalanches, as well as some snowpack and terrain properties associated with avalanching. The article provided much needed data on slab avalanches, and is still widely referenced. Since then, Stethem and Perla (1980) and Föhn (1993) have summarized snowpack data on avalanches. This report also compiles data on avalanches but focuses on skier-triggered avalanches and trigger points outside avalanche start zones. The objectives of this report are to

- compile data on the properties of the snowpack, the slab and the failure/weak layers associated with skier-triggered slab avalanches,
- identify snowpack characteristics for remote triggering, and
- make some suggestions for route selection, operational snowpack observations and avalanche control based on the compiled data.

Remote trigger points and whumpfs

For the purpose of this report, we define a remote trigger point as a site *outside* an avalanche start zone where a skier initiates a fracture that propagates along a weak snowpack layer. This differs from the Canadian Avalanche Association's definition which requires that the fracture releases an avalanche and also that the snow at the trigger point does not slide: *"A remote [avalanche] is one occurring at some distance (typically > 5 m) from the probable trigger point. The snow at the trigger point does not move"* (CAA, 1995). If a skier triggers an avalanche from a location below the start zone that is overrun by the avalanche, we would consider it remote (outside the start zone) but the CAA definition would not consider it to be remote since the snow at the trigger point slides.

A *whumpf* is the sound or feeling associated with a fracture propagating through a weak snowpack layer (Jamieson and McClung, 1996). Downward displacement of the surface of the snowpack and perimeter cracking may or may not be noticed. (This phenomenon is sometimes incorrectly called "settlement".) In some cases, the fracture does not reach avalanche terrain and no avalanche is released. If the fracture starts outside an avalanche start zone, we consider it to be a remote trigger point whether or not an avalanche occurs.

Measurements

Between 1990 and 1998, staff from the research project and supporting agencies measured the properties of the snowpack noted in Tables 1 and 2 in

- the Purcells near Bobby Burns Lodge,
- the Cariboos and Monashees near Blue River, and
- the Selkirks at Rogers Pass and Kootenay Pass.

We have not included similar measurements from the Rocky Mountains in this report.

A start zone is considered skier-tested if one or more people try to start an avalanche by skiing. This involves skiing across the slope and pushing downwards with the skis at places believed sensitive to skier triggering, such as low on a convex portion of a slope.

The measurements for start zones are made at a site in or close to the start zone where an experienced observer judges the snowpack properties to be similar to those where the start zone was skier-tested. We tested 50% of the start zones and trigger points the same day as the avalanche or whumpf and did an additional 42% the next day. The remaining 8% were done 2-3 days after the avalanche or whumpf. We rejected measurements done 1-3 days after the avalanche or whumpf if the observers reported that snowpack conditions had changed substan-

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tially.

When selecting start zones for measurements, we preferred start zones in which the failure layer was likely to be persistent. So, although 57% of the failure layers in skier triggered start zones were persistent (Table 1), this does not imply that such a high percentage of skier-triggered slabs in the Columbia Mountains release on persistent weak layers. Although Stethem and Perla (1980) and Föhn (1993) did not focus on skier triggered avalanches, they present summaries of the weak layers that release avalanches without our bias for persistent weak layers. No such observational bias exists for trigger points since we try to get to as many remotely triggered slab avalanches and whumpfs as practical.

To our knowledge, this is the first study to report the age of weak layers when the overlying slabs were skier-triggered. However, the age is only available for persistent weak layers (facets, depth hoar or surface hoar) for which our staff and supporting organizations record burial dates. Föhn (1993) reported the age of failure layers for slab avalanches but included avalanches with various types of triggers.

To obtain estimates of slab thickness, age of persistent failure layers and grain type of the failure layers (Tables 1 and 2), we also used the avalanche occurrence reports from Mike Wiegele Helicopter Skiing in the Cariboos and Monashees near Blue River, BC (1990-98) and the Purcells near Bobby Burns Lodge (1996-98). However, ski guides report the grain type and date of burial for persistent weak layers more often than for non-persistent weak layers. Many skier-controlled avalanches involve shallow slabs overlying non-persistent weak layers. However, these are so common that the failure layers are generally not of interest and their grain type is rarely reported.

For the compression (or tap) test (CAA, 1995; Jamieson and Johnston, 1996), we apply

- 10 light taps with the fingertips, rotating the hand from the wrist, then
- 10 moderate taps with the knuckles, rotating the forearm from the elbow, and finally
- 10 hard taps with the fist or open palm, swinging from the shoulder.

We usually do 3 tests at each site and report the average number of taps to cause failure in the weak layer in Table 1. If an identified weak layer does not fail in a particular test, we assign it a score of 35. Consequently, if a particular layer fails at 26 taps in the first test and does not fail in the second or third test, its average score is (26 + 35 + 35)/3 = 32.

Shear strengths in Table 1 are based on the shear frame test (e.g. de Quervain, 1951; Roch, 1966; CAA, 1995). Jamieson (1995, p. 55-56) describes the specific technique we use. The shear strength is adjusted for the area of the frame (Sommerfeld, 1980; Föhn, 1987; Jamieson, 1995, p. 81-83).

The techniques for the other measurements are described in *Observation Guidelines and Recording Standards for Weather, Snowpack and Avalanches* (CAA, 1995).

Contrasting remote trigger points with skier-triggered start zones

In contrast to skier-triggered start zones, remote trigger points have a shallower snowpack, and deeper and heavier slabs (Table 1). Also, the failure layers are generally older and warmer. Although the failure layers for remote triggering have generally higher strength than skier-triggered start zones, the median values of rutschblock and compression scores are similar. This is presumably because the stress due

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to the heavier slabs at the remote trigger points combines with the stress due to tapping to cause failure in the weak layer.

At the 32 remote trigger points summarized in Tables 1 and 2, all of the failure layers were persistent. Also, 22% of these failure layers consisted of depth hoar whereas none of the failure layers in the start zones consisted of depth hoar. Presumably, in most start zones in the Columbia Mountains—which are deeper than most remote trigger points—the weak layers of faceted grains rarely develop into depth hoar.

Contrasting skier-triggered start zones with remotely triggered start zones

In remotely triggered start zones, the snowpack is often thinner and the slab thicker and heavier than in start zones directly triggered by skiers (Table 1). Also, the failure layers in remotely triggered start zones are more often persistent and generally stronger than in start zones directly triggered by skiers. Obviously, once a fracture starts in a weak layer it can spread to a start zone and release a thick slab. Although most of the start zones triggered remotely show similar compression and rutschblock scores to directly triggered start zones (Table 1), Logan (1993) and Jamieson (1995, p. 185-194) give examples of apparently stable snow being triggered remotely.

Contrasting remote trigger points with remotely triggered start zones

The trigger points we studied have a shallower snowpack and thinner slabs than the start zones of remotely triggered slabs. Also, remote trigger points have weaker failure planes than do the remotely triggered start zones. This is consistent with the idea that fractures can start in sites where the failure layer is weak and propagate through areas where the failure layer is stronger and the slab thicker (Jamieson 1995, p. 185-194).

Contrasting skier-triggered start zones with start zones that were skier-tested but not triggered

Seventy-five percent of 82 skier-triggered slabs that we measured in start zones are 56 cm or less in thickness (85% ≤ 71cm; 90% ≤ 80 cm). Further, 75% of the 1193 skier-triggered slabs reported by ski guides are 40 cm or less in thickness (85% ≤ 50 cm; 90% ≤ 65 cm). Since the stress induced by skiers decreases with increasing depth (Föhn, 1987; Schweizer, 1993, 1997) we should be aware that failure to skier-trigger a thick slab does not imply that the slab cannot be triggered where it is thinner. Alternatively, when we want to ski-test a slab we should, where practical, seek a place where the slab is thinner, provided the other properties of the slab and weak layer are believed to be similar.

The failure layers for skier-triggered start zones are generally softer (median 4F-) and weaker (shear strength 0.47 kPa) than for the weak layers in start zones that could not be skier-triggered (median hardness 1F-, median shear strength 1.06 kPa). The shear frame test better distinguishes between weak layers that were skier-triggered and those that were not, than does the hand hardness test (CAA, 1995). Unfortunately, it is not well suited to operational testing of start zones since the test requires specialized equipment and a set of 7-12 tests requires at least 30 minutes.

For skier-triggered start zones, median compression scores were lower (14 taps [moderate]) than for stable slopes (21 taps [moderate-to-hard or hard]). Similarly, for skier-triggered start zones the median rutschblock score was lower (RB 3) than for stable slopes (median RB 6). However, there is a large overlap in the stable and unstable ranges

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of these two stability scores. This proves that such tests are not, by themselves, a sound basis for stability evaluation. Such tests should only be used along with other observations of weather, snowpack and avalanche activity to assess snow stability.

Seventy-five percent of the persistent weak layers that were skier-triggered had been buried 5 or more days (Table 1). In many cases, the snow that covered many weak layers in the first 4 days was probably not sufficiently cohesive to release as a slab, or perhaps the skis were penetrating though the slab and weak layer. The fact that 25% of slabs that overlie persistent weak layers are triggered 13 to 56 days after burial is a clear indication of just how long persistent weak layers can remain unstable. Föhn (1993) reported that the disappearance of weak layers was exponential over time and that only half of weak layers had disappeared after 20 days.

The weak layers that were not skier-triggered were only slightly warmer (median -4.2°C) than the weak layers that were triggered (median -5.5°C). These are similar to the previous reported averages -4.6°C (Perla, 1997), -4.6°C (Stethem and Perla, 1980) and -5.9°C (Föhn, 1993). Perhaps the most remarkable aspect of these temperatures is that avalanche forecasting is about trying to predict the behaviour of a material that is often within 5 or 6 degrees of its melting point! For discussion and analyses of the effect of temperature on stability, see McClung (1996) and McClung and Schweizer (1996).

Applications

When travelling in the backcountry, areas of thinner-than-average snowpack may be potential trigger points, especially when a persistent weak layer exists in the snowpack. Once triggered, fractures may release slabs that are thicker and possibly more stable than at the trigger point. Snowpack depth and its variability is worth considering when selecting routes or regrouping sites below avalanche slopes.

As Chris Stethem, Peter Schaerer, Clair Israelson and others have often reminded us, the depth of the snowpack is an important measurement that can be obtained by probing. This simple measurement can help identify areas of thinner-than-average snowpack and, possibly, local areas of weakness. When observing test profiles or doing strength or stability tests, we recommend that the snow depth be measured (or estimated) and recorded to assist those who interpret the tests and profiles. Comments about the snow depth at the profile or test site in relation to average values in surrounding terrain are also helpful.

Although it is difficult to generalize about where to ski-test a slope, areas where the slab, and perhaps the snowpack, are thinner will tend to be more easily triggered. Consequently, ski testing at such areas may contribute to a more conservative stability evaluation. However, we are not sure if ski testing is reliable when the slab is so thin that the skis penetrate through the weak layer.

When skiing to test snow stability or to control avalanches does not produce the desired results, areas of thinner-than average snowpack may be better "targets" than areas of deeper snow.

The ranges of stability indices summarized in Table 1 overlap for stable and unstable slopes. This proves that stability indices are not definitive indicators of stability. They should only be interpreted in conjunction with other observations of weather, snowpack and avalanche activity.

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TABLE 1 SNOWPACK CHARACTERISTICS FOR SKIER-TRIGGERING

	N	Min.	25th percentile	Median	75th percentile	Max.
Snowpack Properties						
Height of Snowpack (cm)						
Remote trigger points	32	74	102	143	216	370
Start zones, skier triggered	58	85	229	295	372	550
Start zones, remotely triggered	12	138	187.5	258	276	390
Start zones, tested not triggered	60	100	215	260	320	450
Slab Properties						
Slab Thickness (cm)						
Remote trigger points	32	18	40	58	79	140
Start zones, skier-triggered	82	7	26	39	56	103
Start zones, remotely triggered	16	31	53	67	83	165
Start zones, tested not triggered	87	14	36	50	74	149
Start zones, observed by guides	1193	5	20	30	40	200
Load (mm H^2O)						
Remote trigger points	25	22	57	76	113	298
Start zones, skier-triggered	67	11	44	67	97	251
Start zones, remotely triggered	14	28	55	79	115	324
Start zones, tested not triggered	68	25	57	90	127	350
Slab Density (kg/m^3)						
Remote trigger points	24	106	132	143	173	214
Start zones, skier-triggered	58	76	116	144	193	375
Start zones, remotely triggered	14	90	114	126	148	197
Start zones, tested not triggered	63	91	143	166	198	395
Properties of Failure Layer						
Hand Hardness						
Remote triggered points	33	F	F	4F	4F+	1F+
Start zones, skier-triggered	72	F-	F	4F-	4F	1F+
Start zones, remotely triggered	14	F	F+	4F	4F+	P
Start zones, tested not triggered	74	F	4F	1F-	1F	P+
Temperature (°C)						
Remote trigger points	30	-9.7	-4.4	-3.7	-2.4	-2.4
Start zones, skier-triggered	69	-19.2	-9.5	-5.5	-4.0	-2.0
Start zones, remotely triggered	15	-9.1	-6.0	-4.1	-3.2	-2.3
Start zones, tested not triggered	69	-18	-6.2	-4.2	-3.3	-1.2

TABLE 1 CONTINUED

	N	Min.	25th percentile	Median	75th percentile	Max.
Density[1] (kg/m^3)						
Remote trigger points	6	180	196	213	244	271
Start zones, skier-triggered	17	55	100	130	173	283
Start zones, remotely triggered	1	-	-	231	-	-
Start zones, tested not triggered	5	105	131	175	220	330
Shear Strength (kPa)						
Remote trigger points	24	0.19	0.43	0.65	0.86	1.26
Start zones, skier-triggered	59	0.04	0.28	0.47	0.69	1.93
Start zones, remotely triggered	15	0.13	0.58	0.73	1.14	1.51
Start zones, tested not triggered	63	0.30	0.65	1.06	1.60	4.02
Age of persistent weak layers (days)						
Remote trigger points	22	8	11	15	26.8	42
Start zones, skier-triggered	42	1	5	10	13	56
Start zones, remotely triggered	12	2	7	10	14	20
Start zones, tested not triggered	38	9	13	17	24	50
Start zones, observed by guides	399	1	6	9	11	58
Stability Indices						
Rutschblock Score						
Remote trigger points	9	2	3	3	6	6
Start zones, skier-triggered	38	1	2	3	4	7
Start zones, remotely triggered	9	2	3	3	4	7
Start zones, tested not triggered	56	2	4	6	6.5	7
Compression (Tap Test) Score						
Remote trigger points	25	3	12	13	15	27
Start zones, skier-triggered	36	1	8	14	17	33
Start zones, remotely triggered	4	9	11	12	14	17
Start zones, tested not triggered	44	7	14	21	25	35

[1]Layers of surface hoar were too thin for density samplers.

TABLE 2 GRAIN TYPE OF SKIER-TESTED WEAK LAYERS

Grain Type[1]	N	PP	DF	RG	FC	DH	SH
Remote trigger points	31	0%	0%	0%	16%	22%	59%
Start zones, skier-triggered	82	11%	32%	1%	20%	0%	37%
Start zones, remotely triggered	16	6%	6%	0%	0%	6%	76%
Start zones, tested not triggered	74	5%	32%	12%	30%	0%	20%
Start zones, observed by guides	363	2%	4%	0%	30%	0%	64%

Acknowledgements

This study is part of an ongoing Collaborative Research and Development Project funded by the Natural Sciences and Engineering Research Council of Canada and BC Helicopter and Snowcat Skiing Operators Association whose members include Canadian Mountain Holidays, Cat Powder Skiing, Chatter Creek Mountain Lodge Ltd., Crescent Spur Helicopter Holidays, Great Canadian Helicopter Skiing, Great Northern Snow Cat Skiing, Island Lake Mountain Tours, Island Sauvage Airmoble Outdoor Adventures, Klondike Heli-Skiing, Kootenay Cat Skiing Limited Partnership, Kootenay Helicopter Skiing Ltd., Last Frontier Heli-Skiing Ltd., Mike Wiegele Helicopter Skiing, Monashee Cat Skiing, Mountain Heli-Sports, Peace Reach Adventures Ltd., Purcell Helicopter Skiing, R.K. Heli-Skiing, Retallack Alpine Adventures, Robson Heli-Magic, Selkirk Tangiers Heli-Skiing, Selkirk Wilderness Skiing, Sno Much Fun Cat Skiing, TLH Heli-Skiing, Tyax Heli-Skiing Ltd., Whistler Heli-Skiing Ltd., White Grizzly Adventures Ltd., Association of Canadian Mountain Guides, Canada West Ski Areas Association, Marsh & McLennan Ltd.

For their assistance with field studies, we thank Parks Canada, the BC Ministry of Transportation and Highways, the Canadian Avalanche Association, Canadian Mountain Holidays, and Mike Wiegele Helicopter Skiing. For helping us collect this field data since 1990, we are grateful to Leanne Allison, Peter Ambler, Roger Atkins, Ken Black, James Blench, Jeff Bodnarchuk, Alex Brunet, Andrew Bullock, Steve Chambers, Peter Clarkson, Sam Colbeck, Aaron Cooperman, Bert Davis, Alan Dennis, Alan Evenchick, Jamie Fennell, Joe Filippone, Sylvia Forest, Michelle Gagnon, Will Geary, Torsten Geldsetzer, Jeff Goodrich, Sue Gould, Brian Gould, Jim Gudjonson, Todd Guyn, Reg Hawryluk, Mike Henderson, Larry Hergot, Jim Haberl, Rob Hemming, Karsten Heuers, Greg Hill, Jill Hughes, Nick Irving, Gerry Israelson, Dena Jansen, Colin Johnston, John Kelly, Troy Kirwan, Karl Klassen, Marc Ledwidge, Garth Lemke, Janet Lohmann, Steve Lovenuik, Kevin Marr, Eric Martin, Greg McAuley, Rodden McGowan, Alan McKeeman, Tony Moore, Al McDonald, Bruce McMahon, Derek Peterson, Cathy Ross, Ken Schroeder, Lisa Palmer, Simon Parboosingh, Tim Quinn, Lisa Richardson, Jock Richardson, Peter Schaerer, John Schleiss, Jürg Schweizer, Mark Shubin, Bert Skrypnyk, Dave Smith, Alex Taylor, Ty Trand, Julie Timmins, John Tweedy, Scott Ward, Rupert Wedgewood, George Weetman, Barry Widas, Terry Willis, Adrian Wilson, Percy Woods, Chris Worobets, Kobi Wyss, and Linda Zurkirchen.

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Our thanks to Mike Wiegele Helicopter Skiing and Canadian Mountain Holidays for providing the avalanche occurrence reports from their ski guides.

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SARSCENE '98

Sarscene '98 - Working Together to Bring Them Home: Professionalism in SAR is a search and rescue workshop aimed at providing a forum for Canadian Search and Rescue personnel to voice concerns, share ideas and build strong communication bonds in the field of search and rescue.

Approximately 600 participants are expected from air, land and marine organizations across Canada (Department of National Defense, Royal Canadian Mounted Police, Environment Canada, Canadian Coast Guard/Fisheries and Oceans, Parks Canada, provincial and municipal governments, as well as volunteer organizations). International search and rescue organizations will also be represented.

From September 23rd to the 27th of September 1998, the seventh annual *SARSCENE* Workshop will take place in Banff, Alberta. Co-hosted by the National Search and Rescue Secretariat and the Alberta search and rescue community. The workshop will feature the second annual SAR Games, lectures, the Trade Show and a Technical Rescue Day.

For trade show information:

Phone:
(616) 992-8215
or
1 800 727-9414
Fax: (616) 996-3746
E-Mail:
isabelle@nss.gc.ca

For registration information:

SARSCENE Registrar
275 Slater, 4th Floor
Ottawa, Ontario K1A 0K2
Phone:
(616) 996-4737
or
1 800 727-9414
Fax: (613) 996-3746

The Avalanche Handbook Update

We are requesting information, corrections and additions for a new edition to be published in 2000. We are looking to improve the selection of photos if people have suggestions. If you have something you wish to send in, please do so to:

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Digital Avalanche Rescue Transceivers Are we ready for the transition?

By Nic Seaton
Snow Avalanche Technician
Ministry of Transportation and Highways

Statistics have shown that in order to have a 50% chance of finding someone alive in an avalanche burial, you must find them in the first thirty minutes. Time is of an essence. Throughout the years there have been numerous inventions that have been designed to help speed up the avalanche rescue process. To date, there has been no better invention than the avalanche rescue transceiver, which has proven time and time again to be the fastest means to find someone buried in an avalanche. Although very efficient, in order to operate a transceiver effectively, it has always required a fair amount of training and practice.

Over the past fourteen years, I have worked as an Avalanche Technician for the Ministry of Transportation and Highways. During this time, avalanche rescue transceivers were constantly being improved by the manufactures. As these transceivers were changing on an annual basis, testing them became an important part of my job. Throughout the years numerous improvements have been made, some of which were very beneficial to the industry as a whole. Such as the addition of the external speaker, the semi directional LED lights and the frequency change which increased the range. All of these changes proved beneficial when attempting to shave valuable seconds off avalanche burial search times.

One of the biggest problems that our highways operation faces with avalanche rescues, is the minimal amount of time that can be spent training personnel in the operational procedures of the transceiver. With this in mind I have spent many years waiting for the breakthrough in technology that will alleviate this problem. One of the main detriments with the existing transceivers is that technical advancement has been limited by analog technology. Just think if one day a transceiver could tell you how many people were buried, how far away each one was, where exactly they were located, all in a matter of seconds. With digital technology, this wish is not that far out of our reach.

It now appears that the digital race has begun. This past winter the first digital avalanche rescue transceiver was introduced to the market. This new transceiver called the Tracker is a substantial change from the present analog technology. By using a combination of multi directional antennas, a micro processor, a numeric distance display screen and directional LED lights the Tracker allows you to follow the "Flux Line" to the buried transceiver. However, due to problems with past introductions of new technology, there is some skepticism as to whether or not it will work.

In the early 1990's, Canada and later the USA made the transition from the 2.275 khz frequency to the 457 khz frequency. The main reason for this change was that the 457 was a better frequency and would provide, among other things, a greater receive and transmit range. One of the biggest problems that occurred during this transition period was the incompatibility between the two frequencies. The only way a transceiver on 457 khz could detect a transceiver on 2.275 khz was if one was a dual frequency (both frequencies in one transceiver), which in itself was a problem as the dual frequency only had the range of the 2.275 khz frequency (about 20 to 30m). In order to prevent any compatibility problems, the entire market had to change to the new

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frequency at the same time. This was not the case, and there ended up being a mixture of both frequencies in operation for some time, thereby potentially jeopardizing the success of a rescue. Not only were there two different frequencies being used but the new 457 transceivers had design problems as well. Condensation penetrating inside the units became so bad that the speaker would fail, and in some cases the antennas detached, creating a sporadic signal problem. And the list goes on. It is my belief that most people who went through this transition period would most likely choose not to do so again, even though the transceivers which eventually evolved from this period are reliable and work well.

When the transition in the early 90's was made to the 457 frequency, the Ministry of Transportation and Highways was obligated to purchase over a thousand new transceivers. Obviously the costs that were incurred have been substantial and as mentioned above the new transceivers had their fair share of problems. Many were sent back for warranty repairs within the first two months of purchasing. As the saying goes "once burned, twice shy" which meant the Ministry would not be purchasing any new avalanche transceivers before they were tested extensively.

The decision to test the Tracker was made because it was felt that if this new transceiver were as easy and as fast to operate as the manufacture has claimed, it would be ideal for our type of operation. The following report is based on certain tests that were performed on the Tracker. As the Tracker is the first transceiver to be released with digital technology many of our tests that are normally performed on analog transceivers had to be modified in order to accommodate the Tracker. I should also mention that these tests do not compare digital to analog technology, but simply measured the performance of the Tracker, which happens to use digital technology.

Like the Ministry of Highways, the Helicopter Skiing Industry has a similar training problem with their clientele. Mike Wiegeles helicopter skiing has also tested the new Tracker. Some of their findings have been included in this report.

This report is divided into the following categories:

- The Trackers basic operating functions
  - Directional LED lights
  - Numeric distance display
  - Loudspeaker
  - Transmit indicator light
  - Search button
  - Options button
  - Self diagnostic check
- Power consumption
- Maximum ranges
- Pulse rates
- Multiple analog and Tracker burials
  - 1st search technique
  - 2nd search technique
- The jumped flux line
- Close proximity burials
- Search times
- Summary

Basic Operating Functions

Directional LED lights

The direction lights are easy to operate but can be quite hard to see in bright sun light (cupping your hand over them will help). This problem occurs with most transceivers that use display lights as a search tool. The objective with the Tracker is to get the centre of five lights to illuminate and then walk in the direction that will allow the centre light to remain on. If a light on either side is on then the Tracker expects you to track in that direction in order to bring the light back to the centre.

Numeric distance display

The distance display screen is used for several different options. The most important be-

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ing that it provides the distance from the searcher to the buried victim via the flux line. Similar to the directional lights, the numeric distance display screen can also be hard to see in the bright sunlight.

Loudspeaker

The loud speaker allows you to hear both transmit and receive signals. It can easily be turned off to help prevent confusion that is generated from hearing multiple signals from other transceivers within the search party.

Transmit indicator light

When the transceiver is transmitting, this light will continue to flash at its designated pulse rate.

Search button

In order to go to Search Mode, you must hold down the search button for one full second. When performed properly SE will appear in the distance display screen confirming that you are now in search mode. After 5 minutes the transceiver will initiate a warbling sound which alerts the searcher that it will revert back to transmit mode in ten seconds. If the searcher wishes to continue searching then the search button is simply pressed again which will provide another 5 minutes of search time. For users that have a complete understanding of the Tracker this process seems to work well. However, the concern with this option is when a rescue is in progress, some of the people involved may have limited knowledge of the Trackers operating procedures. Although they may think they are still in search mode they may have actually reverted back to transmit mode. The concept behind the idea is great, but in all practicality it may cause an unnecessary amount of confusion at the rescue site.

Options button

If in search mode and the options button is pressed, an SP will appear in the display screen. This option takes the normal 180-degree search band in front of the transceiver and makes it approximately 25 degrees, thereby masking out any signals that do not fall into the SP search band area. This option is suggested by the manufacture when searching for multiple transceivers. The manufacture also suggests that in order for this feature to work, you must slow down considerably.

The options button can also be used to turn the speakers on and off. By pressing the Options button twice an L0 will appear in the display screen and the speaker will be turned off. When the speaker is off, press twice again and the speakers will be turned back on and an L1 will be displayed.

Self diagnostic check

When the Tracker is turned on, it will perform it's own self-diagnostic check on the LED lights and the transmitter and receive functions. It then displays in a percentage the amount of battery power remaining. If there is a failure in the diagnostic check, a flashing "F" will appear in the display screen.

Power consumption

The Tracker requires 3 AAA batteries, which will provide a minimum of 200 hrs in transmit mode followed by 1 hr in receive mode. At the moment, the manufacture recommends that batteries should be changed when they drop below 80%. Using new batteries, test results showed that after 2.5 hrs in receive mode, battery power had dropped to 80%. Again using new batteries, after 78 hrs in transmit mode battery power was down to 77%. If you were to follow the manufactures recommendations and change the batteries at 80%, working a six-hour day in transmit only, batteries would need to be changed every 13 days.

In talking with the designer of the transceiver he informed us

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that these recommendations would be changed, as the transceiver will operate safely well below 80%. Our test results showed this to be the case. When our batteries reached 39% we were still able to receive and transmit between 25 and 30 meters.

Maximum Ranges
All measurements were rounded off to the nearest 5 meters. Orientation of transceivers was either ***In line*** or ***Perpendicular***. Table 1 shows the results from the maximum range tests.

Table 1 Maximum Ranges

Pulse Rates
After doing numerous multiple burials with a mixture of

Transceiver	Pulse Rate (per min)	Pulse Rate (per sec)
Tracker - DTS	75	0.8
Pieps - Opti Finder	65	0.9
Arva - 8000	52	1.15
SOS - F1nd	50	1.2
Ortovox - Focus	50	1.2

TABLE 2

When the Tracker detects a signal it processes the information and then displays it on the screen. At the end of this process it can receive another signal. If you are searching with the Tracker for multiple analog and Tracker burials, because the Trackers pulse rate is faster than the analogs, the buried analog signal can be over powered by the buried Tracker signal. Thereby, creating dead spots and possibly taking a long time to detect the analog signal.

Transceiver orientation	Ortovox Focus	Pieps 457	SOS F1nd	Arva 8000	Tracker DTS
Tracker transmitting and analog receiving ***in line***	70m	70m	70m	60m	N/A
In line signal with Tracker receiving	35m	35m	40m	30m	35m
Perpendicular signal with Tracker receiving	25m	35m	30m	25m	30m

TABLE 1

Tracker and analog transceivers, it became apparent that signal pulse rates play a major role in the performance of the Tracker. The faster the pulse rate the greater the chance of the Tracker locking onto it. This makes it difficult for the searcher to isolate the transceivers with slower pulse rates. Table 2 shows the pulse rates of the transceivers tested.

Table 2 Pulse Rates

Multiple analog and Tracker burials

In an attempt to deal with this problem, Mike Wiegeles operation and I worked with two very different techniques. Both techniques took a lot of practice and even then they were still inconsistent. In addition to the inconsistency, both methods may be quite difficult for a new user. The following section describes the two search techniques used.

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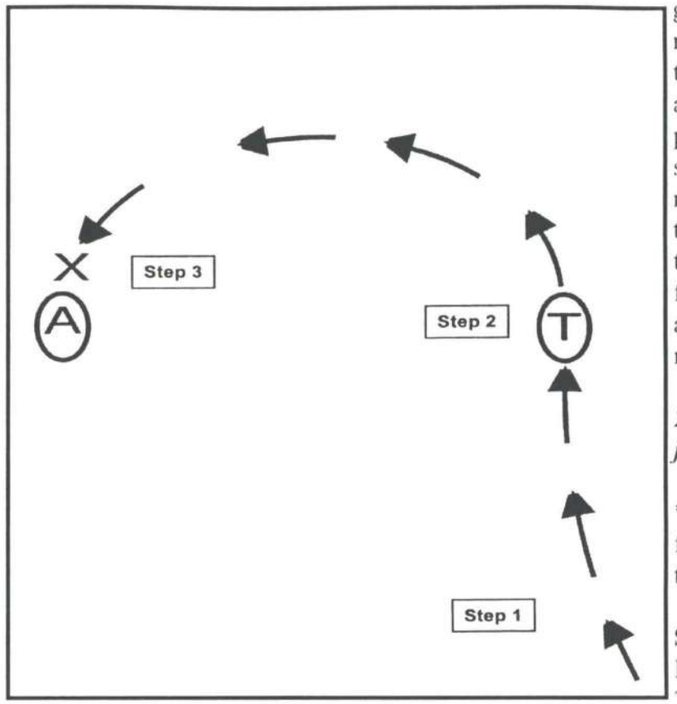
Figure A Multiple Analog Digital Burial



1st Technique (use in conjunction with Figure A)

Step 1
The Tracker is left on search mode until you have pinpointed the first buried transceiver. This will most likely be the Tracker as it has the faster pulse rate.

Step 2
In order to pick up the analog signal, while standing over the buried Tracker you must go to SP mode. Your movements should now slow down to approximately a third your the normal speed. This is due to the pulse rate of the transceiver that you are searching for being much slower than the Trackers. Compounding the problem the SP mode has only a 25-degree wide search band which makes it easy to pass over the signal if you move the transceiver too fast. Once acquiring the analog signal follow it very slowly. If the signal disappears keep walking in the same direction and the signal will most likely return (see Jumped Flux Line on following page).

Step 3
Once you have achieved the lowest distance on the display screen you will need to tilt the transceiver down and again look for the lowest distance. Once acquired follow that angle in. Sometimes within 2 meters of the buried transceiver the signal can disappear completely. If this happens, back up, reacquire the signal and go back to SE mode. You will now pick up the signal from the transceiver that you have previously found, but you should also be able to pick up the analog signal.

2nd Technique (use in conjunction with Figure A)

** Mike Wiegeles guides found this to be the easier of the two techniques to use **

Step 1
Enter the area with the Tracker on search mode and pinpoint the first transceiver. Again you will most likely find the buried Tracker first.

Step 2
In order to acquire the signal from the analog transceiver stay in SE mode and step far enough away from the transceiver that you have just found, to a point where it allows you to pick up the other signal. You now will be working with two signals. Attempt to isolate the signal that you feel is indicating a different direction from the one you

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have just found. When the second signal has been detected you may still encounter dead spots. As with the first technique attempt to walk through these spots to reacquire the signal.

Step 3
Different from Step 3 in the first technique, you may or may not need to tilt the transceiver down (sometimes it is not necessary when in SE mode). With this technique you should also not have to deal with the dead spot 2 meters away from the buried transceiver (this seems to be mainly a problem with the SP mode).

The Jumped Flux Line

Different pulse rates can also accent a situation that we have called the "Jumped Flux Line". When one transceiver is buried in a specific orientation to another, there can sometimes be an overlap in the flux lines. With the analog transceivers this situation has most likely always been happening. However, when using the Grid method, as you use the volume of the signal to search, this crossing of flux lines does not seem to have any affect, as your tendency is to walk straight through the area where the flux lines cross. If using the Induction method, you may encounter this problem on the odd occasion, but only if you were to stop in the exact spot the flux lines cross. However, due to the Tracker using a search technique that continuously follows the flux line it potentially can jump to a different flux line much easier than the Grid or Induction method. This situation can happen with any two transceivers, but it is more prevalent when coming off a transceiver with a faster pulse rate. Such as a Tracker and an Ortovox or a Pieps and an Ortovox.

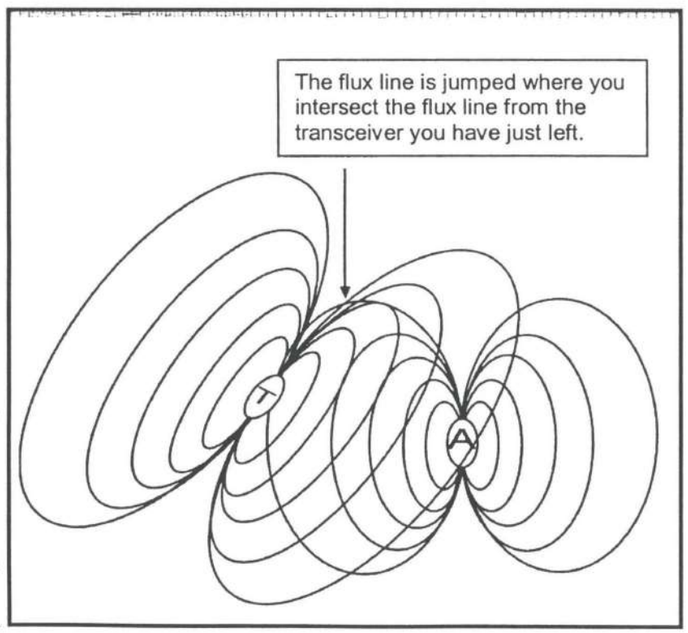

Figure B The Jumped Flux Line

(Use Figure B for the following Jumped flux line explanation)
Assume you have pinpointed the Tracker (T) and are standing over it. You can use SP or SE mode to come off it depending on which technique you prefer. Once you have acquired the analog (A) signal and begin to follow the curve of the flux line toward it, you may come to a location where there is a null signal. Your tendency will be to swing the transceiver from left to right in an attempt to reacquire the signal. The outcome may be that you pick up the signal to your left which is the flux line from the Tracker (T). You have now just jumped the flux line. As

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you begin to follow it your curve will straighten out and your distance display numbers will begin to increase. To prevent yourself from walking away from the analog (A) transceiver, you must back up and reacquire your original flux line. This time maintain your curve and walk through the null area. You should pick up the analog signal again and then be able to follow it in.

Although no one but the manufactures know how next years digital transceivers will operate. It is a good possibility they too will follow the flux lines like the Tracker. With this in mind, I think we should expect the jumped flux line problem to remain with us. If in our training sessions we are using digital transceivers, we should probably be demonstrating the jumped flux line problem and teach a method to work around it. In order to eliminate any further confusion people need to have an understanding of why it is happening. Dealing with this problem is really no different than dealing with some of the problems we have already encountered with analog transceivers. It is simply something that needs to be taught.

Close Proximity Burials

One other area of note where the pulse rates can cause some confusion was in close proximity burials (1 to 3 meters apart). Using only analog transceivers, this type of search is generally quite hard to perform, and the Tracker on Tracker is no exception. Without a good understanding of the way the Tracker works, and a lot of practice, close proximity burials can be very difficult. However, if there is a burial with a mixture of analog and Tracker transceivers within 3 meters of one and other, it can sometimes be almost impossible to pin point them without having to systematically probe the area.

Search Times
Tests were conducted to determine whether the Tracker was faster at searching for multiple and single burials than the analog transceivers. At the same time due to concerns throughout the industry that the Trackers range is much less than the present analog technology, tests were performed to determine whether these concerns had validity. Listed are the type of tests that were performed and guidelines that were adhered to:

- Tracker search times compared to analog search times when searching for single and multiple burials.
- Tracker search times compared to analog search times when searching for a **mixture** of analog and Tracker transceivers in multiple burials.
- In order to address the range concerns, tests started from 30 and 60 meters.
- The Grid method was used when searching with the analog transceivers.
- All targets were considered found when struck with a probe.
- Multiple burials were 10 meters apart and approximately 50 cm below the surface.
- Experienced Avalanche Technicians from the Ministry of Highways and Professional Ski Patrol from Apex Mountain were used to conduct the Search Tests.

(Use Table 3 for the following Search times explanation)

Group 1
These results show that when the Tracker is searching for either another single Tracker or a single analog transceiver it was generally faster than if searching with the analog transceivers. Also in this group, if you compare the search times of the 30m range to the 60m range it does not appear that the Trackers
shorter range hinders the

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Table 3 — **30 and 60 Meter Search Times**

Transceivers Tested	Search time (30m)			Averag e time	Search time (60m)			Averag e time
Group 1								
Tracker searching Pieps	.46	.39	.35	.40	1.25	1.34	1.11	1.23
Tracker searching Tracker	.47	.42	.51	.47	1.04	1.04	.53	1.00
Tracker searching Ortovox	.57	1.13	1.09	1.06	1.11	1.22	1.12	1.15
Ortovox searching Tracker	1.07	1.14	1.02	1.08	1.15	1.48	1.17	1.27
Pieps searching Tracker	2.10	1.32	1.11	1.38	2.06	1.29	1.32	1.42
Group 2								
Tracker searching 2 Trackers	1.28	1.15	1.36	1.26	2.19	2.16	2.2 1	2.18
Ortovox searching 2 Trackers	3.19	3.48	3.07	3.25	3.20	4.10	2.5 0	3.26
Pieps searching 2 Trackers	3.01	2.22	3.40	3.01	4.32	3.28	2.4 6	3.35
Group 3								
Tracker searching 1 Tracker 1 Ortovox	**6.28**	2.18	3.48	4.11	1.49	**5.16**	4.02	3.42
Tracker searching 1 Tracker 1 Pieps	3.23	1.52	**6.04**	3.46	2.13	3.01	2.21	2.31
Group 4								
Ortovox searching 1 Tracker 1 Pieps	3.32	3.40	3.35	3.35	3.14	2.46	2.18	2.46
Pieps searching 1 Tracker 1 Ortovox	2.55	1.59	3.47	2.53	2.20	3.21	2.51	2.50

search times. This may be a different story if you were to use a Tracker to search a 90m wide deposit, with no last seen location. However, this scenario was not tested.

Group 2
Both the 30m and 60m ranges show that this type of search is where the Tracker excels. It is much faster than the analog transceivers in both ranges.

Group 3
This is where the pulse rates became a problem. Search times became inconsistent. In some cases times were below 2 minutes, other search times were well over 6 minutes. When we first began the mixed analog and Tracker burial tests, in some cases we were over 9 minutes and forced to stop and start again. Practice with this test was found to improve the search times.

Group 4
Using the analog transceivers as the receiving units, search times were fairly consistent.

Summary
Manufactures of the Tracker have promoted their transceiver as the fastest to use, and the easiest to learn. This appears to be the case when searching with the Tracker for single analog, single Tracker and multiple Tracker burials. Tests conducted on inexperienced clientele at Mike Wiegeles helicopter skiing have shown that when using the Tracker for these basic search techniques, times were decreased dramati-

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cally in comparison to the time taken when searching with analog transceivers. Guides conducting these tests felt they could simply tell their clients to "keep the light in the centre and go until the distance numbers can go no lower". From past experience when teaching the Grid or Induction methods far more in-depth instruction is necessary.

However, as our tests showed, when putting the Tracker through a series of mixed multiple analog and Tracker burial tests, it became apparent that it was less than 100% compatible with the analog transceivers. It would work, but it was inconsistent. Throughout the testing process, when using the Tracker as the receiving unit, there was a tendency for it to isolate the more rapid pulse rate and in some situations not allow the slower pulse rates to be detected. This caused a fair amount of confusion when conducting the search with both inexperienced and experienced users.
As the Tracker was the only digital transceiver on the market this winter it meant that it was the only one that we could test against the existing analog transceivers. In all fairness to the other manufactures, we should not jump to conclusions and suggest that there will be compatibility problems with all the new digital transceivers. However, our tests show that pulse rates play a major role in whether or not the digital transceiver will be fully compatible with the analog transceivers. At the moment, none of the transceivers on the market have the same signal specifics, and this is not expected to change with the introduction of the new transceivers.

As today's avalanche rescue transceivers are being used for so many different types of applications, and as time is so important when working a rescue, there will always be a demand for the transceiver to be faster and easier to use. The Tracker has made some substantial progress in this area and has certainly put the industry on notice that digital technology will most likely be the way of the future.

Arva will be introducing their new digital transceiver in time for next winter while Pieps will be bringing theirs out the following winter. Ortovox will also be introducing a new transceiver that is said to be an analog unit with a digital display screen. Will these new digital transceivers be compatible with the existing analog and digital transceivers? Time will tell, but one thing is for certain, the manufactures are leading us into another transition period, which will take us from analog to digital technology. In the long term this will most likely be beneficial to the industry. However, in the short term there is a good possibility that these new digital transceivers will not be fully compatible with the existing transceivers.

In order to deal with this compatibility problem, I believe that two points need to be considered.

1. Implementing more specific set technical signal standards. These standards must not restrict the manufactures ability to introduce new ideas and improve their products, enabling them to maintain a competitive advantage.

2. The avalanche industry must tell the manufactures what we need - a rescue transceiver that is fully compatible with all other transceivers, simple to operate and easy to use under any type of conditions. If a new transceiver is introduced to the market and does not meet these requirements then the industry should simply not support it. This would put more onus on the manufactures to ensure that extensive field testing was done

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prior to a transceiver being introduced to the market.

Since the completion of testing, the manufactures of the Tracker agree that compatibility between all avalanche transceivers is a major concern for those of us operating in avalanche terrain.

This leads me to believe they are making every attempt to eliminate the problems discussed in this report. Therefore, it is evident that if we are available to provide our expertise to the manufactures, the products they supply us with could be tailored directly to our needs.

This would give us the ability in the future to have avalanche rescue transceivers that are so easy to operate a thirty second introduction is all someone would need in order to find a buried victim quickly.

Beating The Odds

1996 Banff Film Festival Finalist. An avalanche video for people who work and play in the mountains.

Available from the Canadian Avalanche Centre.

Snow Safety and Education

The Canadian Avalanche Association , the Canadian Ski Patrol and the SmartRisk Foundation have teamed up and are looking to increase awareness in the schools.

The team has now applied for federal funding for a three year project on snow safety education to be taught through out high schools in BC and Alberta.

The BC and Alberta education ministers have agreed to look over materials and will consider making avalanche awareness and snow safety part of the school curriculum.

Sledding in Avalanche Terrain
Reducing the risk

Sledding in Avalanche Terrain is a book written by Bruce Jamieson and Darcy Svederus. It is the companion to *Backcountry Avalanche Awareness.*

Both of these books are put out by RAC (Recreational Avalanche Course), and are now used as the student manuals for the RACourses.

Sledding in Avalanche Terrain is based on a book written by Bruce called *Avalanche Safety for Snowmobilers.* The book will be available in the fall.

Sledding in Avalanche Terrain includes:

- search and rescue techniques
- safety measures for sledding in avalanche terrain
- field tests for recognizing unstable snow
- avalanche danger ratings
- phone numbers for current avalanche conditions

For more information on these books or to find out more about RAC please call the Canadian Avalanche Centre.

Watch our web site for information on Canadian Avalanche Association Training Schools.

The dates and course locations will be announced soon.

http://www.avalanche.ca

Did you know??

This is a fun little article that ties into our history story on the Chilkoot Pass.

In 1897-98, the North West Mounted Police set up a border crossing into Canada at the summit of the Chilkoot. They ordered every stampeder to carry a year's worth of supplies. After all, there was no turning back once they were into the Klondike, and commerce was limited, to say the least.

As a result, many stampeders struggling up the mountain rampart were bent double under the weight of their packs, which typically contained the following:

Chilkoot Trail 1898 Supplies:

McDougall and Secord Klondike Outfit List (clothing and food):

- 2 suits heavy knit underwear
- 6 pairs wool socks
- 1 pairs heavy moccasins
- 2 pairs german stockings
- 2 heavy flannel overshirts
- 1 heavy woollen sweater
- 1 pair overalls
- 2 pairs 12 lb. blankets
- 1 waterproof blanket
- 1 dozen bandana handkerchiefs
- 1 stiff brim cowboy hat
- 1 pair hip rubber boots
- 1 pair prospectors' high land boots
- 1 mackinaw, coat, pants, shirt
- 1 pair heavy buck mitts, lined
- 1 pair unlined leather gloves
- 1 duck coat, pants, vest
- 6 towels
- 1 pocket matchbox, buttons, needles and thread, comb, mirror, toothbrush etc.
- mosquito netting/ 1 dunnage bag
- 1 sleeping bag/ medicine chest
- pack saddles, complete horses
- flat sleighs
-
- 100 lbs navy beans
- 150 lbs bacon
- 400 lbs flour
- 40 lbs rolled oats
- 20 lbs corn meal
- 10 lbs rice
- 25 lbs sugar
- 10 lbs tea
- 20 lbs coffee
- 10 lbs baking powder
- 20 lbs salt
- 1 lb pepper
- 2 lbs baking soda
- 1/2 lb mustard
- 1/4 lb vinegar
- 2 doz. condensed milk
- 20 lbs evaporated potatoes
- 5 lbs evaporated onions
- 6 tins/4 oz. beef extract
- 75 lbs evaporated fruit
- 4 pkgs. yeast cakes
-
- 20 lbs candles
- 1 pkg tin matches
- 6 cakes borax
- 6 lbs laundry soap
- 1/2 lb ground ginger
- 25 lbs hard tack
- 1 lb citric acid
- 2 bottles jamaica ginger

Today, many adventurous travelers re-trace the steps of the Klondike stampeders, but their burden of supplies has been significantly lightened:

Chilkoot Trail 1998 Supplies:

To fit in one backpack:

- tent
- sleeping bag
- sleeping pad
- warm layered clothing
- broken-in hiking boots
- rain/snow gear
- quick-cooking nutritious food
- energy bars/chocolate
- coffee/tea & powdered milk
- camp stove
- pots & pans
- cutlery
- binoculars
- camera & film
- journal or novel
- trail book
- personal toiletries
- first aid kit
- bug repellent

For more info on Klondike Capers:
http://www.touryukon.com/03klon/03c7.html

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CHILKOOT PASS ENDNOTES

1. Dyea Press, 5/21/98, p. 2.

2. The following accounts recorded gold rush slide activity: Condon, "Letters," p. 9; Victoria Colonist, 12/22/98, p. 2; Satterfield, Chilkoot Pass, 1978, p. 136; Lyons, "An American Girl's Trip," p. 21; Mizony, "Gold Rush," p. 7; Moore, Skagway, p. 45; Heller, Sourdough Sagas, p. 79; Price, From Euston to Klondike, p. 84; White, "Diary," p. 3; Beatty, "Diary," 5/2/98.

3. Jay Cable, Interview by Frank Norris, 3/5/86.

4. Dyea Trail, 4/9/98.

5. New York Times, 4/10/98, 6/13/98; Lung/Martinsen, Black Sand and Gold, p. 376.

6. The campers who evacuated the Scales later found out that slides had buried many tents after they left. New York Times, 6/13/98.

7. The number of tramway workmen has been variously estimated as 17, 19 and 23; published lists of the dead inexplicably indicate that only five were involved. New York Times, 4/10/98; Lokke, Klondike Saga, p. 63; Graham, "Diary," pp. 5-6; Steele, Forty Years in Canada, p. 307; Dyea Press, 4/6/98.

8. Lokke, Klondike Saga, p. 63; Bearss, Klondike Gold Rush, pp. 116-17.

9. Several sources have erroneously suggested that the main snow slide took place on the Peterson route, or on the main trail above the Scales. Alaska DNR, "The Chilkoot Trail," 1968, p. 15; William R. Hunt, North of 53 (New York, Macmillan, 1974), pp. 48-49; William Bronson with Richard Reinhardt, The Last Grand Adventure (New York, McGraw Hill, 1977), p. 96; Cohen, The Streets Were Paved With Gold, p. 65.

10. Newspaper reports called this the O&I powerhouse. Both the Oregon Improvement Company and the Alaska Railroad and Transportation Company were subsidiaries of the Pacific Coast Steamship Company transportation network. New York Times, 4/10/98; Dyea Trail, 4/9/98; Bearss, Klondike Gold Rush, p. 117.

11. Lokke, Klondike Saga, p. 63; Bearss, Klondike Gold Rush, pp. 116-18.

12. New York Times, 6/13/98; Mizony, "Gold Rush," p. 7; Lung/Martinsen, Black Sand and Gold, p. 379.

13. Dyea Press, 4/6/98.

14. Lung/Martinsen, Black Sand and Gold, p. 377; Dyea Press, 4/6/98.

15. Lokke, Klondike Saga, p. 63; Bearss, Klondike Gold Rush, p. 118; Nerland in NAHA, Norwegian-American Studies, p. 136.

16. Mizony, "Gold Rush," p. 7.

17. Several sources have implied that the Sheep Camp rescuers were on the scene within fifteen minutes. Inasmuch as two and one-half miles separated Sheep Camp from the slide site, this is unlikely. It is true that some rescue work, by the survivors from the Scales party, began immediately after the slide. But the lives of those involved in the slide were not contingent upon the speed by which the rescuers arrived. Some victims, such as the tramway workers, may have been killed immediately, while others evidently suffocated several hours later. This conclusion is disputed by a report which claimed that those buried most deeply in the largest slide were killed instantly by the great weight of snow which cascaded down upon them. Hypothermia did not appear to be a major cause of death. Dyea Trail, 4/9/98; Lung/Martinsen, Black Sand and Gold, p. 378; Bearss, Klondike Gold Rush, p. 119; Dyea Press, 4/6/98.

18. Lokke, Klondike Saga, p. 62; New York Times, 4/10/98; Dyea Press, 4/6/98; Hunt, North of 53, p. 49.

19. Tuck, "Klondike Diary," p. 7; John J. Hjelsing, "My Trip to the Gold Fields of the Klondike," unpub. mss., p. 8; Lung/Martinsen, Black Sand and Gold, p. 378.

20. Spude, Chilkoot Trail, pp. 181-87; Dave Clabaugh, unpub. mss., 1979, in KLGO "Tragedies" file.

21. The Dyea Trail, in its May 28 edition, later revised its estimate to 51 dead. Kolloon, "Crossing the Chilkoot Pass," p. 3; Dyea Trail, 4/9/98; Tuck, "Klondike Diary," p. 7; Nerland in NAHA, Norwegian-American Studies, p. 136; Lokke, Klondike Saga, p. 62; C.L. Andrews Collection, Box 5, Folder 59, p. 13.

22. Graham, "Diary," pp. 5-6; J.W. (Will) Patterson, "Excerpts from Letters," pp. 15-16; Davis, Sourdough Gold, pp. 50-51.

23.Edward Magawly Banon "Diary"p.3; George A. Pringle as told to Louise A. Pringle,"Tragedy on the Chilkoot Trail," Alaska Sportsman 28 (May 1962), p.32; Mizony, "Gold Rush," p.7; Black, My Ninety Years, p. 26.

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24. Bearss, Klondike Gold Rush, pl. 73; Dyea Trail, 4/9/98.

25. Nerland in NAHA, Norwegian-American Studies, p. 136; Dyea Trail, 4/9/98, 4/11/98.

26. Berton, Klondike, p. 266; Davis, Sourdough Gold, pp. 52-53.

27. Dyea Trail, 4/9/98; C.L. Andrews Collection, Box 5, Folder 59, p. 12; Patterson, "Excerpts," p. 16.

28. Clabaugh mss., 1979; Lung/Martinsen, Black Sand and Gold, p. 380.

INTERNATIONAL SNOW SCIENCE WORKSHOP

The International Snow Science Workshop 1998 is scheduled to be held in the Northwest at Sunriver Resort in central Oregon from Sunday September 27 through Thursday, October 1,1998. A Merging of Theory and Practice, this 4-day workshop brings together practitioners and researchers within the avalanche and snow community for a sharing of ideas, observations and research. The spectrum of sharing includes topics on avalanche control, mountain weather, avalanche education, snowpack physics, snow processes and avalanche dynamics, among others. Practitioners and researchers are encouraged to participate through papers and posters. The last workshop in Banff, Alberta had over 450 attendees from around the world, and provide a great forum for learning for everyone.

Spectacular scenery and abundant opportunities for outdoor recreation surround the Sunriver Resort and Conference Centre with rolling meadows and the Deschutes River just outside the workshop door, and several volcanic peaks of the nearby Cascade Range within easy reach.

For more information please contact:

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AVALANCHE NEWS

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