THE Avalanche REVIEW

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National Avalanche Center
2001-2002 Season Roundup

Compiled by Janet Kellam

Compiler's note: This article is a compilation of season summaries from the network of Regional Avalanche Centers that receive funding from the US Forest Service. In the past, we have produced this article in the spring, leaving a gaps with no information from the late spring and summer seasons. TAR is now publishing this roundup in the fall issue, in hopes of providing a more complete summary of avalanche center information. There are two additional Avalanche Centers in the NAC network: UAC/Bear River Avalanche Center-Logan and the Tahoe National Forest Avalanche Center. Their season summaries were unavailable at press time.

Forest Service National Avalanche Center

Those of us in the FS National Avalanche Center like to think of ourselves as the little center with the big name. The NAC has two employees, Karl Birkeland in Bozeman, Montana and Doug Abromeit in Ketchum, Idaho. The NAC, among other things, provides program guidance and support to local FS avalanche centers, facilitates technology transfer to FS field units, coordinates the FS national avalanche awareness program and manages the FS military artillery program.

The past year was a good one. The NAC started the season by hosting the annual fall meeting for US avalanche centers. We held the meeting in Snowbasin, Utah and devoted one day to the nuts and bolts business of running an avalanche center and a second day to cutting edge avalanche technology including several excellent scientific presentations. Over the winter, the NAC completed its evaluation of the Swiss Nearest Neighbor Model (NXD2000) and the Swiss SNOWPACK Model; we continue to evaluate the Swiss SnowMicroPen. NXD2000 is currently installed at Snowbasin, Red Mountain Pass, and the FS Utah Avalanche Center. Currently there are insufficient funds to run SNOWPACK from a central location for the avalanche centers. The NAC feels very fortunate to have the cooperation of the Swiss Federal Institute for Snow and Avalanche Research and many of its scientists on these projects.

The NAC helped fund FS instructors for the National Avalanche School, and it provided funds for Doug Chabot to develop an avalanche awareness CD for snowmobile riders. This CD has been distributed to hundreds of avalanche educators. The NAC has also produced an avalanche awareness video for backcountry snowboarders and skiers. The video will be available for distribution in October, in conjunction with Black Diamond, the AAA and the American Avalanche Advisory Fund. This fall, the NAC will update and supplement its website, including its avalanche tutorial, with a complimentary CD.

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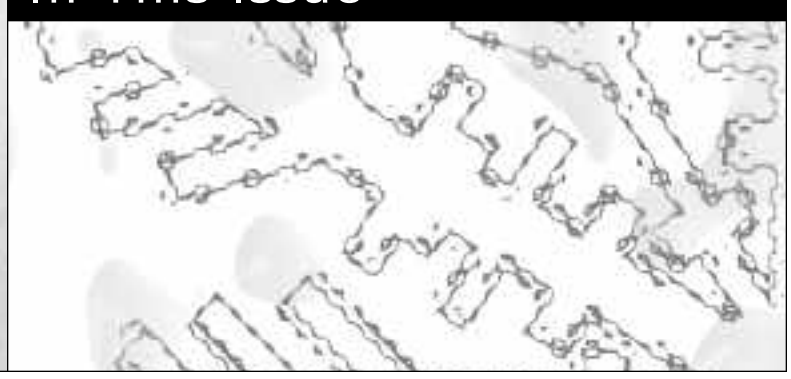

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The mission of the AAA is:

A. To provide information about snow and avalanches;
B. To represent the professional interests of the United States avalanche community
C. To contribute toward high standards of professional competence and ethics for persons engaged in avalanche activities;
D. To exchange technical information and maintain communications among persons engaged in avalanche activities;
E. To promote and act as a resource base for public awareness programs about avalanche hazards and safety measures;
F. To promote research and development in avalanche safety.

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Contributions: Please submit material eight weeks prior to publication date. Include address and telephone number. Please submit typed manuscripts by e-mail or disk (3.5", Zip or CD), using any popular word processing program. Submit any figures in B & W, or as a TIFF or EPS file (300 dpi resolution at 100%). We will return materials if you include a stamped, self-addressed envelope.

FROM THE PRESIDENT: RUSS JOHNSON

The first cool nights have started to turn Truckee and the northern Sierra toward fall. The anticipation of a change in season has just begun. I visualize the stirrings among the tribes as people lay plans for the trek north to Penticton.

An El Nino winter on the horizon! Like most of my skiing friends, I automatically associate a "big" winter with this phenomenon. After reviewing Knox Williams' fine article on El Nino (Dec. '97), I am still undeterred in my expectation of a bountiful snowfall this season.

For the American Avalanche Association, the season looks active as well. We will be instituting our instructor certification program under the leadership of Jerry Roberts. Jerry has been involved in avalanche education since 1976, teaching numerous Level 1 and 2 courses. His consulting and forecasting career has taken him from the Rockies to Chile and back. He is currently a forecaster for the Colorado Avalanche Information Center working at Red Mountain Pass. Although there were six qualified applicants for the job, the Executive Board felt his qualifications were a good fit for this new position. We are excited about working with Jerry to get this new program off the ground.

The certification program was brought about by requests from the public and avalanche schools. The Avalanche Association decided to provide a program of instructor certification based on researched, verifiable resumes. Applicants for certification must satisfy standards, which have been published in TAR.

There are two things that the program does not attempt. It does not certify avalanche schools, and it cannot guarantee a certified instructor is a good teacher. The AAA does not have the personnel or resources to send people out to avalanche schools to critique instructors. As of now, we are not prepared to certify individual schools. There may come a time when this is possible – a time when the demand exists — but as an initial step, we feel this program is something we can accomplish.

The success of the program hinges on two separate issues. First is simply the sheer number of applicants. If there are few applicants then we may conclude the program isn't worth pursuing. We don't believe this will be the case, and many people have already expressed a good deal of interest. Secondly, it is critical that the program be administered in an objective and fair way. Each applicant, regardless of experience, must submit a complete resume, which will be researched and evaluated on its merits. No one should expect to be "grand fathered" in.

If these two issues are satisfied, then we will have a successful and sustainable program for years to come.

— Russ Johnson

The Avalanche Review Editorial Policy

The content and style of The Avalanche Review reflects the mission of the AAA and its membership's diverse interests and experience.

- The AAA and The Avalanche Review welcome submissions from AAA members and non-members.
- The staff of The Avalanche Review will review, edit, and proofread all submissions.
- The staff of The Avalanche Review will provide an opportunity for writers to review any suggestions on organization, style, or substance prior to publication. Authors may withdraw submissions prior to publication.
- The AAA encourages all authors to use The Avalanche Review staff as a resource for developing and refining the content, organization, style and format of their submissions.
- Publication decision lies with the Editor and appeal with the Publications Committee.

AAA NEWS & EVENT SCHEDULE

8th Annual Northwest Forecasters' Meeting and the Washington Avalanche Control Council

By Jon Andrews

March 18th and 19th were the dates of the eighth Northwest Forecasters' meeting, held this year at Crystal Mountain. This meeting has been an annual event where forecasters, ski patrollers, heli guides and patrol directors gather and discuss various topics such as avalanche control programs, ski area boundary issues, snow science, snow and avalanche studies and explosives for avalanche control issues. Every year we move the group to different ski areas and highway departments to look at their control programs and ski their area. A lot of good information exchange has taken place in these gatherings. We average around twenty people at each meeting.

Areas involved are Schweitzer Mountain Resort in Idaho, and in Oregon, Mt. Hood Meadows, and Mt. Bachelor. Attending from Washington were North Cascades Heli-skiing, Mission Ridge Ski Area, Stevens Pass Ski Area, Stevens Pass DOT, Mt. Baker Ski Area, Crystal Mountain Ski Area, Alpental Ski Area, Snoqualmie Pass Ski Area, Snoqualmie Pass DOT, and Cascade Powder Cats, White Pass ski area, the Washington State Land I explosives division, and the Northwest Weather and Avalanche Center. I hope I did not miss any one.

Many folks at these organizations are conducting various snow and avalanche studies. This forum gives them an opportunity to present their studies and gain new ideas.

The main topic of discussion for the past several years has been explosives for avalanche control. Because of past situations, we have seen the need for more unified and better training with explosives and more information exchange on all topics that deal with explosives, snow and avalanches.

This last season we formed a group called the Washington Avalanche Control Council (WACC). This group represents two hundred and twenty Washington State licensed blasters for avalanche control. Also participating are the Northwest Weather and Avalanche Center and a few folks from the Washington state L and I dept. explosives division. The WACC has a group e-mail listing for communicating quickly on issues that arise. The State of Washington is allowing this group to have input on issues concerning changes in state law pertaining to avalanche control. We have a good working relationship between the State and the WACC.

Six foot crown of natural avalanche on old faceted layer. Photo by Shane West.

We held several meetings of the group and discussed the similarities and differences we have in our avalanche control programs. We actually found a lot of common ground. We have seen the need to, as a group, agree on some of the differences among our programs. When you get together as a group and have common ground, state and federal agencies and private sector organizations look at this as a good thing.

Safety of course is our number one goal in the use of explosives. Add up all the complexities of avalanche control, such as weather conditions, engineering shots for the type of snow pack you have, shooting at the right time, public, route safety according to conditions, then add hundreds of blasters to the picture, and you have the potential of running into some real situations. The need for everyone to have good training and communication with other explosives users is really important.

The WACC has become a corporate group member of the International Society of Explosives Engineers (ISEE). The ISEE is a large group of blasters that have many information avenues on training, and various blasting topics. Joining gives us the opportunity to be more involved with other explosives users. It gives us access to training seminars through the ISEE, it gives us voting privileges in the society, and gives us access to thousands of blasters through out the world with whom to communicate.

The National Ski Area Association has set up guidelines for explosives use for avalanche control. This is a working document. It seems more explosives control programs are able to fall under these guidelines. The new updated NSAAguidelines should be out this fall.

Grouping together and finding common ground especially when you are talking about explosives is a good thing.

Jon Andrews is the forecaster at the Stevens Pass ski area in Washington. He has been working in the explosives industry, in both avalanche control and construction blasting, for the past 22 years. He is a Professional Member and Northwest Section Rep of the AAA. Contact him at Stevens Pass Ski Area via e-mail at jandrews@stevenspass.com or by phone at (206) 812-4510 ext. 355.

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Backcountry Access Announces Avalanche Education Support Program

Backcountry Access, Inc. (BCA) of Boulder, CO has announced a program to support North American avalanche education and training. The company is offering $20,000 in funds and equipment this season to avalanche educators and students across the U.S. and Canada. To qualify, educators must show a long-term commitment to the education of winter recreationists and a compelling need for funds and/or products. The products that the company is offering in the program include the Tracker DTS avalanche transceiver, BCA's Companion and Tour shovels and probes, and Stash packs.

"As the industry leader in beacon sales, we felt it was our responsibility to get more people educated so they stay out of avalanches in the first place," said BCA Vice President Bruce Edgerly.

In addition to supporting educators across the country, BCA will accelerate its own education program. BCA principals and technical representatives will provide avalanche awareness presentations at key locations across North America in 2002-03. The objective, according to Edgerly, is to get consumers interested in the subject of snow safety and to drive them into on-snow Level I avalanche courses. "Our goal isn't to compete with existing avalanche educators, but to make more people aware of their courses," Edgerly said.

BCA will also continue to offer its existing educational materials for teaching students to use avalanche transceivers. These materials include the Tracker DTS Instruction Guide and BCA's popular life-sized vinyl flux diagram. The diagram sells at their cost of $25, but is also available free of charge to educators who qualify for grants.

For more information on BCA's education support program, contact BCA at (303) 417-1345 or info@bcaccess.com. You can also reach the company at: Backcountry Access, Inc., 2820 Wilderness Place, Unit H, Boulder, CO 80301 or on the web at www.bcaccess.com. ❊

First Call for Papers: International Symposium on Snow and Avalanches in Warm Climatic Zones

Snow and Avalanche Study Establishment (SASE), a research and development organization dedicated to control avalanche problem in the Indian Himalaya, has announced the first call for papers for an international symposium on snow and avalanches in warm climatic zones. The symposium is scheduled for April 21-23, 2004 in Manali, India. The symposium will include three days of indoor sessions and a one day outdoor session with visits to Rohtang pass and Beas Kund Glacier.

The symposium will focus on the mechanical and physical behavior of snow found in warm conditions. Snow found in the Indian Himalaya and in neighboring mountains in Central Asian countries evolves in relatively warm conditions. Little research has been done on snowpacks that exist at temperatures above 10 degrees C. The symposium will help in addressing the problems related to avalanche activity specifically found in Indian Himalaya. Symposium organizers have identified the following themes for papers:

- Mechanics and Physics of snow in warm climatic conditions.
- Avalanche phenomenon in warm climatic zones vis-a-vis cold climatic zones.
- Avalanche Forecasting techniques in warm climatic conditions.
- Avalanche Control Engineering with special reference to Structural Control, Artificial triggering and controlled release in warm climatic zones.
- Utilization of satellite imageries and remote sensing techniques for identification of avalanche hazard and its mitigation techniques.
- Mountain weather phenomenon in mid latitude region and its prediction using meso-scale models.

The symposium organizers propose be publishing the symposium proceedings in *Annals of Glaciology*. For more information, contact:
SS Sharma, Symposium, Snow and Avalanche Study Estt. (SASE), RDC, Him Parisar, Sector 37A Chandigarh UT 160036. Tel: 0172 699804-06. Fax: 0172 699802

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METAMORPHISM

Wolf Creek Ski Area in southern Colorado has named Scott Kay as Ski Patrol Director and Juan Cullum as Assistant Director.

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The Avalanche Review Bibliography Vols. 11-20, Nov 1992 – August 2002

Compiled by Steve Conger

Editor's Note:This bibliography is the second of two listing all articles from the first 20 years of TAR. It is intended to help readers find articles of interest, unread or previously read and dimly remembered.

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MEDIA

Winning the Media Game

Part 2: Dealing with Print and Television Media

By Bruce Tremper

Editor's note: This article is the second of three articles outlining practices for making the most of media contacts. Bruce's article in the last issues of The Avalanche Review *covered talking points and media packets. The last article in the series will appear next issue and will address press releases and what to do when things go wrong.*

Bruce Tremper making the most of a media opportunity. Photo by Cordell Wolking and Bruce Tremper

Dealing with print media

I love dealing with reporters from print media. They don't shove cameras and microphones in your face, they usually talk with you over the telephone, they're usually on a much more relaxed deadline than television media, and they can put about ten times more information into their story than television. Here's how to work with reporters from print media:

Keep in mind is the fact that, unless they work for a big-budget national magazine, they almost never record the interview. They operate on a tight time deadline and they don't have time to play back a recording. Ninety five percent of the time, they will either write or type as you talk.

First rule: We talk about ten times faster than they can write. If you don't want to be misquoted, then you must talk SLOWLY… and… repeat…everything…twice. I usually tell them right off the bat what I'm doing so that they don't think I'm weirder than I already am. They usually say, "Oh don't worry; I do this all the time." Don't believe them. Try writing as someone talks and you'll see what I mean. Talk slowly, and repeat everything twice. No exceptions.

Second rule: You WILL be misquoted. Get over it. In the thousand-or-so of times that I have been quoted in newspapers and magazines, I can count only a couple times that I have been quoted accurately. They usually get it sort of right or half-right but never, never completely right. Sometimes what they get is atrocious. They are on very tight deadlines, and with nothing recorded, there's no accountability, so they suffer absolutely no penalties for misquoting, especially if you work for the government. Unfortunately, misquotes and misinformation are rampant. It's just the way it is. I thought I would never find myself saying this, but dealing with the media gives me a lot more sympathy for politicians. It also makes me very skeptical of everything else I read in the newspapers because they almost always get avalanche stories wrong. This fact is the best reason to have a media packet.

Third rule: It's OK to say, "Yes, I would love to talk with you. Can I collect my thoughts and call you back in ten minutes?" Remember that this interview is a partnership. They want a good story with good quotes, and you want to represent your organization well or get critical information out to a wider audience.

Fourth rule: At the end of the interview ask the reporter to read back your quotes to you so you can "help them catch any obvious errors that could embarrass them," as I usually put it. They will usually comply, and I usually find a number of quotes that are incorrect to the point of being dangerous. Remember that they are your quotes, and you have a right to review them for accuracy.

Dealing with television

Television. It's all an illusion—all theater—and if you know how to play the game, it can be a very powerful tool. But if you don't have the patience of a saint and the inclination to do some simple work on your thespian skills, then you will find it a nerve-wracking, humbling experience.

Television requires some training. Work with your public affairs people to get some media training. If you don't have access to media training, you can train yourself. Get a video camera, put it on a tripod and spend as much time as you can in the hot seat. Work with a partner and trade off asking and answering questions. Do it over and over until you feel comfortable with how you look and sound when you play back the tape. This process takes time, so don't expect to be an instant master.

Here are some basic pointers for doing television interviews:

How to prepare: Wear dark, solid

colors. Checkered shirts flicker on camera and bright colors look like neon. Also, make sure you're showered and shaved. I used to come in for my forecast day without taking a shower or shaving because when I wake up at 3:00 am, any time I can save helps. I don't do that anymore. When an avalanche fatality occurs, the four local TV stations usually descend on our office with their cameras, and I catch hell from my bosses if I look like a terrorist or a climbing bum on the evening news. We always keep a dark Cashmere sweater at the office for interviews and a Forest Service shell for the outdoor interviews. We have a Forest Service shield with Velcro on the back so we can always place it strategically in every shot. Our public affairs folks love it.

Having said this, remember we're avalanche people, and television crews expect us to be colorful and eccentric. The media wants the real deal, not a company spokesperson. Be yourself.

Also, comb your hair (if you're lucky enough to have some left), and most important, go into the bathroom and pat your face down with a paper towel to get rid of the shine. In my case, I do this for the top of my head too. Don't drink too much coffee. The interview alone will keep you wide-awake. Coffee just makes your voice dry and jittery. Drink lots of water.

How to sit or stand: Television likes to zoom in on your face. Too much movement makes your head wobble in and out of the frame. Plant yourself firmly in the chair with good posture and prop your elbows on the armrests. Watch out for swivel chairs or chairs with wheels. For stand-up interviews, put one foot in front of the other with your back foot sideways and your front foot straight out in a "T" shape so you won't be tempted to sway from side to side. At a podium, pretend your belly button is glued to the podium. Any gestures you make with your hands need to be done right near your face and done slowly, so that the camera operator has a chance to zoom out to catch them.

How to talk: Americans tend to talk in very monotone voices that put people to sleep. Concentrate on making your voice very animated. Talk with the pitch of your voice moving up and down more than you do in normal conversation. Act excited about your subject. Talk in plain, colorful language, with no jargon and no scientific terms. Get to your point quickly. Slow talk and long pauses will kill any sound bite. By now, you should have worked with your talking points enough to make them short, colorful and plainspoken. Remember that anything longer than about ten seconds is typically unusable or will be chopped up. Keeping your points this short takes LOTS of practice. Remember too that you can do several takes of each answer to get it right.

Doing the interview: Television news programs operate on incredibly tight time constraints. Their deadline is the 6:00 p.m. news or the 10:00 p.m. news, and if you don't return the station's call immediately, they will find someone else in a New York minute. It's a good idea to develop a relationship with the local news channels and make sure they know your cell phone number — and to always carry your cell phone with you. Opportunities to preach the avalanche gospel to a wider audience don't come very often, so you have to strike while the iron is hot.

When you meet the crew, find out the focus of their piece and the length of sound bites they want. For instance, for a typical evening news show, you will probably get one 5-10 second sound bite. A half-hour documentary is luxurious by comparison because it allows for longer sound bites and more of them. They will also have a larger budget and can spend more time with you.

Once you find out the focus of the program and the questions they want to ask, rehearse your answers over and over in your head while they are setting up. They usually take a long time to set up, so you will have time. Remember to tidy up and pat your face down with a paper towel.

The crew will help you get the microphone in place. The cord usually goes under your shirt or jacket and the transmitter goes in a side or back pocket. Plant yourself in a position so you don't move your head too much and you're ready to roll.

First rule: It's not about you; it's about the message. I have always liked the advice that Paul Newman gave to Mathew McConaughey early in his career, "Take your work seriously, don't take your self seriously."

Some people think that being on television is a big deal, but it's not. It won't change your life in any way even if you appear on national documentaries. At least it never did anything for me. So leave the ego out of it.

Leaving your ego out of things is often more easily said than done. Some techniques can help. If you are feeling shy, nervous or self conscious, do what champion athletes and Zen masters do — turn off your mind and focus your awareness on here and now. Look intently at something—the back of the chair, the reporter's eyes—anything. Notice the texture, the color, and other details. You can also focus on your breathing. Feel everything, hear, smell, taste and look. Drop into the calm infinity of total awareness—the "zone" as athletes call it or "shikentaza" as it's called in Zen practice. The ego and the mind are only an illusion anyway, and they dissolve like a desert mirage when you ask them to take a couple steps back and focus on total awareness.

Second rule: Unless it's a live, panel discussion format, you should NEVER look at the camera. Always look at the interviewer. Don't look down or up when you're thinking. It looks stupid on TV. If you must look away while you're thinking, it's better to look to the side.

Third rule: Unless it's a stand-up interview with a hand-held microphone, the interviewer doesn't have a microphone, so the audience can't hear the interviewer's questions. ALWAYS include the subject in your answer. This rule takes a lot of practice, and it's easy to forget. For instance,

Interviewer: "How do avalanches occur?"
Answer without subject included: "They occur when….."
Answer with subject included: "Avalanches occur when…."

Interviewer: "Are you concerned about these conditions?"
Answer without subject included: "Yup."
Answer with subject included: "I'm very concerned about these conditions because…"

Fourth rule: Video is cheap. You can answer the question repeatedly until you are satisfied with your answer. For instance, I usually give at least two takes on every answer. After my first take, I'll say, "Let me try that again and see if I can give you a shorter sound bite" or "Let me try that again a different way." Remember, this is your interview, not theirs, and they want a good sound bite just as badly as you do. Sometimes I'll do five or six takes until I feel like I've gotten it right.

Fifth rule: When it's over, it's over. Dealing with media is often a slam-bam-thank-you-man experience. By the time the show airs, or the story runs in the newspaper, reporters and crews will be off working on their next project. They will be hard-pressed to remember your name. No, they won't give you a copy of the videotape or mail you the article even if they promised to do so. Don't be offended. They're just busy.

Also, realize that the reporter turns the story over to an editor and then moves on to the next story. Editors will rewrite the story and chop it up for the space left over after the advertisers are taken care of. Editors know nothing about avalanches, so they will make plenty of mistakes. Also, yet another person writes the titles for newspaper and magazine stories, and this headline writer will also make mistakes. It's just the way it is, so don't expect perfect stories.

Bruce Tremper is the author of Staying Alive in Avalanche Terrain (2001 Mountaineers Books). He has worked as Director of the Utah Avalanche Center since 1986; he previously worked at the Alaska Avalanche Center, Big Sky Ski Area, and Bridger Bowl Ski Area. He has a Master's Degree in Geology and is a professional member of the AAA.

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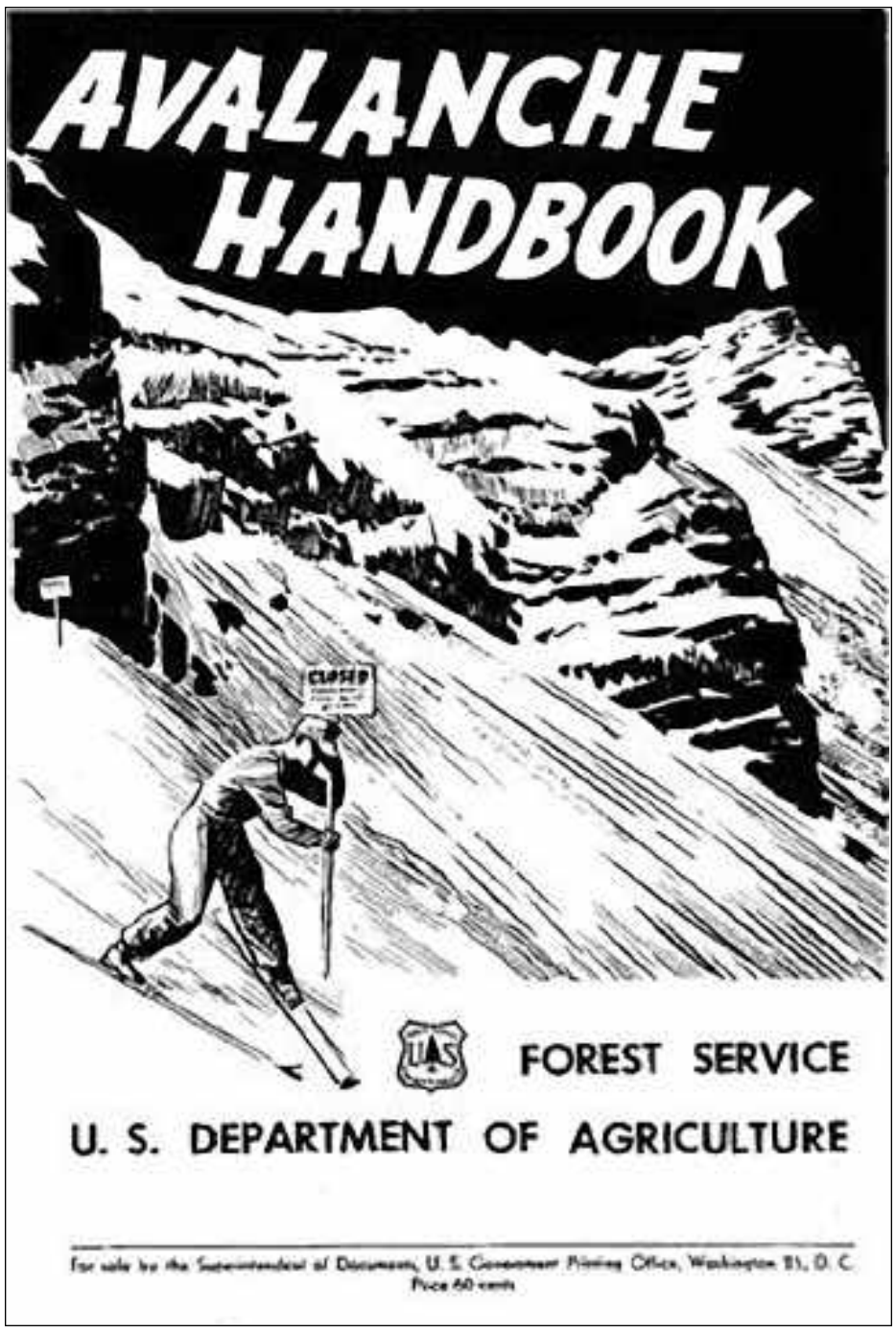
AVALANCHE HISTORY

The Avalanche Handbook is 50 years Old!

By Mark Mueller

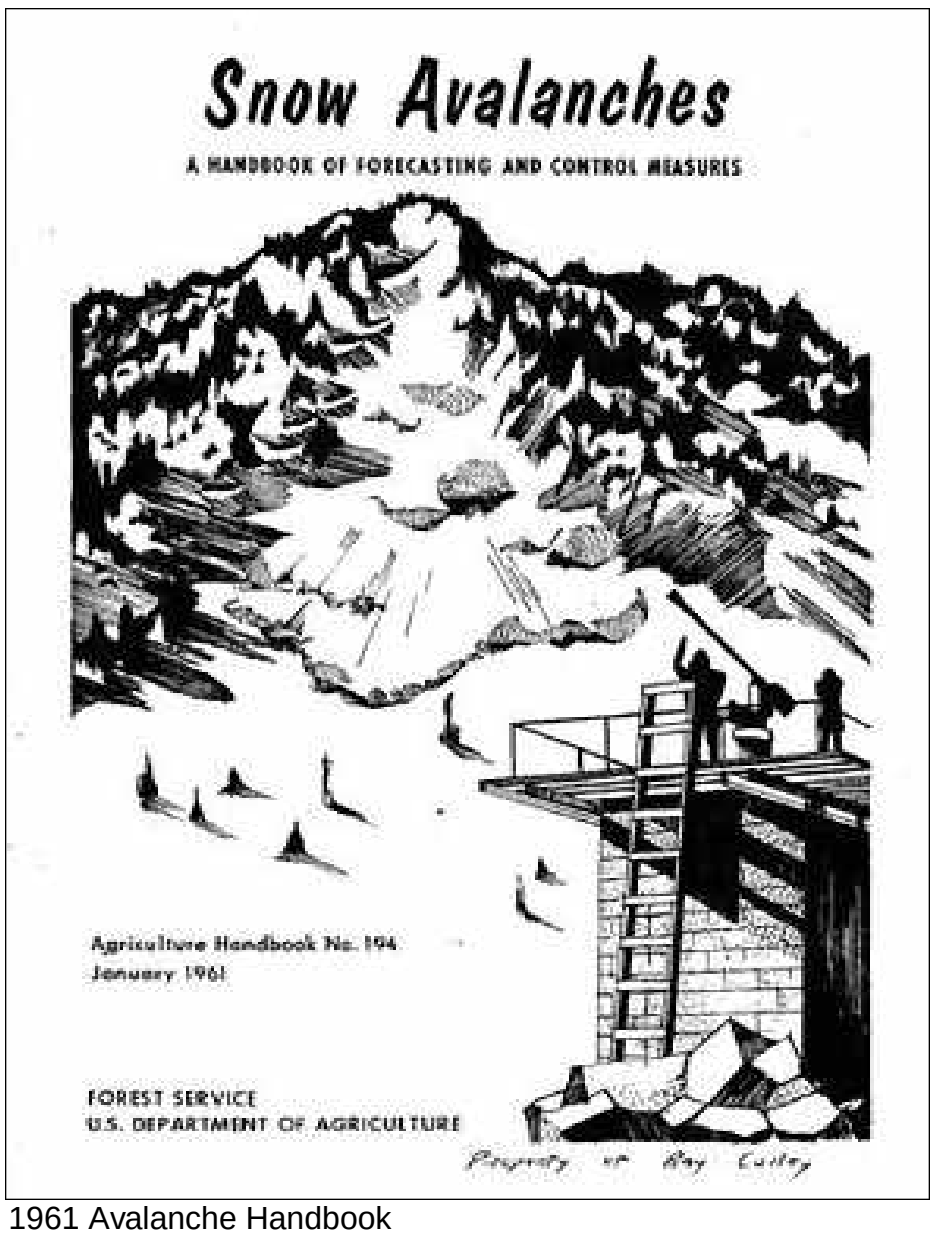


1952 Avalanche Handbook

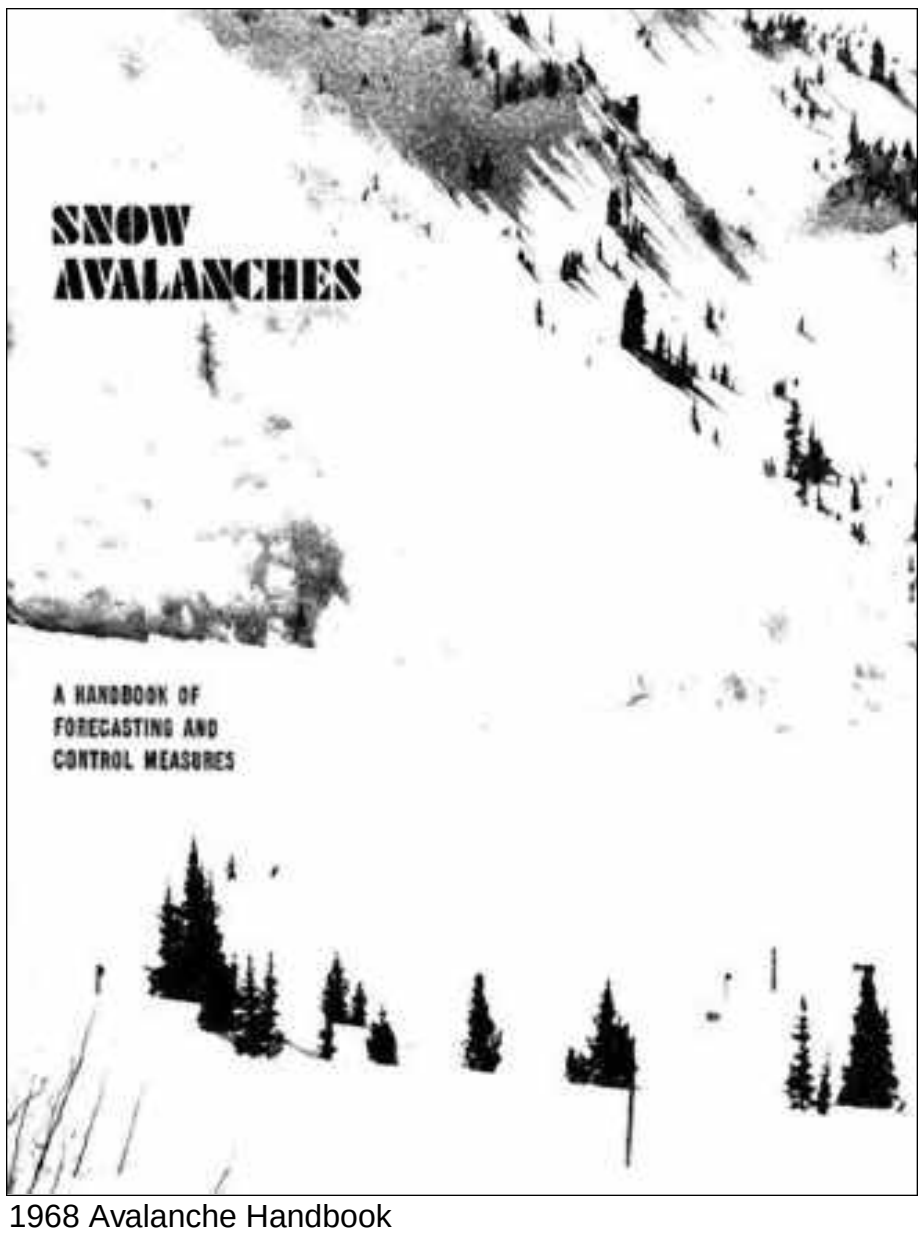
On the summer of 1952, the US Government Printing Office published the first Avalanche Handbook, written by the pioneering American avalanche hunter and Alta Snow Ranger Monty Atwater and Wasatch National Forest Supervisor Felix Koziol. The soft cover 1952 Handbook was 146 pages long and cost 60 cents. The past 50 years have seen three updated versions of the Handbook: one in 1961 by Dr. Ed LaChapelle, a second in 1976 by Ron Perla and Pete Martinelli, and the most recent in 1993 by Dave McClung and Peter Schaerer. All the while The Avalanche Handbook has remained the "bible" for professional avalanche workers in North America and probably worldwide. Often when preparing presentations about snow, avalanches, and avalanche mitigation, I have referred to the current version of the Handbook to make sure I'm covering my topic thoroughly or to ensure I'm using current and established terminology. In years past, as avalanche season began, I often sat down with the Handbook for an umpteenth re-read. I knew I would come across something that would further illuminate my understanding of avalanches.

In his Forward to the latest Avalanche Handbook (McClung, Schaerer 1993), Dr. LaChapelle writes, "With almost nothing in the way of prior information to guide him, Atwater used his keen observation skills and shrewd insights to lay the basis for avalanche forecasting and control." Atwater's earliest results appeared in 1948 as "Alta Avalanche Studies," which he co-wrote with Felix Koziol. Further rapid advances led to the earliest US Forest Service training programs and the need for a more comprehensive manual, which appeared in 1952 as the "Forest Service Avalanche Handbook." The Ten Contributory Factors are a product of the Alta Avalanche Studies. Monty says little of the first Handbook in his classic memoir, The Avalanche Hunters; he mentions only that, "In 1952, at the end of the Winter of the Big Snow, I wrote and the Forest Service published The Avalanche Handbook," and that, "It was intended to be a textbook, a progress report, and a manual of operations." Monty is perhaps more direct in the Preface to the 1952 Handbook, where he writes,

> This handbook has been prepared primarily for the guidance of Forest Officers concerned with the safety of skiers using winter sports areas within the national forests. It discusses the various phases of avalanche hazard evaluation and control in layman language. Although parts of the handbook are devoted to a description of the research methods developed to eval-



1961 Avalanche Handbook



1968 Avalanche Handbook

> uate hazard and snow stability, the primary purpose of the handbook is for the guidance of the 'man-on-the-ground' in coping with the problem.

He elaborates in the Introduction,

> The handbook serves a threefold purpose. It is intended first as a textbook which again summarizes our knowledge to date on avalanches. It is intended second as a field handbook for the guidance of administrators who have duties where avalanche hazard is a problem. It is intended finally as a second progress report."

The 1948 Alta Avalanche Studies were the first progress report.

The first Handbook was very timely. A series of severe winters affected western US mountain ranges beginning in 1948-49, culminating in Monty's "Winter of the Big Snow," in 1951-52. During that period, the Forest Service established additional observation stations at Berthoud Pass, Colorado and first at Mt. Baker and then Stevens Pass, Washington. Monty and his colleagues realized, "Our principal objective was the protection of human life and it doesn't take a slide of great size to kill a man. Thus our priorities of work were determined for us: first, immediate recognition of hazard; second, reduction of hazard, and third, basic research if there was any time left for it." Monty proudly observes, the severe "winter of 1951-52 saw no avalanche accidents, fatalities or property damage on winter sports areas protected by Forest Service snow rangers."

It is interesting that the cover of the 1952 Handbook shows a Snow Ranger placing a "Closed" sign. Even at this time slope closure was seen as having limited effectiveness and active avalanche control using explosives was complementing and would soon supersede slope closure as a primary avalanche mitigation method. The 1952 Handbook calls closure, "the simplest protective measure that can be applied," but then notes "It is also the least desirable. To some extent it defeats the purpose of developing and using an alpine (ski) area." The 1952 Handbook discusses test skiing and protective skiing and describes the benefits of skier compaction. It also discusses the use of artillery, and Monty looks forward to the day, "when the 75 mm recoilless cannon becomes available to avalanche busters," due to its portability. Electric detonation of hand charges was still mandatory in the Forest Service in 1952 and the Handbook did not discuss the use of safety fuse and fuse caps. Monty observes, "A rule of thumb is that a standard charge of 16 to 20 pounds of military demolition of similar explosives controls 100 feet of slope width" and "The only hard and fast rule in explosives operations is to use plenty."

The first Handbook barely mentioned the evolution and metamorphism of the snowpack. The use of the penetrometer by Richard Stillman at Berthoud Pass is discussed briefly in an appendix, "Avalanche Research in the United States." Sample profiles are shown with some interpretation and the term "cup crystals" is used once in one profile. Later editions offer a more thorough treatment as the role of the snowpack in avalanche hazard become more evident.

The treatment of avalanche rescue is brief; probing is the only technique covered, although the use of avalanche dogs in Switzerland is mentioned. The Handbook emphasizes the importance of speed, retaining and returning eyewitnesses to the accident scene, and identifying the last-seen-point. Two hours is observed to be "the average survival limit." It also includes several case histories, the first "Snowy Torrents".

In The Avalanche Hunters, Monty portrays himself as a meticulous record keeper, and he emphasizes the responsibility of complete, accurate records in the original Handbook. "Record too much rather than too little information." And, "These records are not routine paperwork. They are the only basis for improving snow safety methods." The Handbook contains numerous examples of charts and reports including a "Standard Snow Terminology" to assist field observers in their observations and impart some standardization of terms.

One may think that it would be easy to read through this work of 50 years ago and find many errors or dated information, but I found that exactly the opposite is the case. Most of the information provided is as applicable today as it would have been in 1952, and I find Monty's words from 1952 are just as applicable to today's avalanche hunters, "The study of avalanches is far from finished. There is probably more work ahead of us than behind us. Of all the destructive natural forces, the avalanche has the most complex background and the dividing line between danger and safety is the most obscure."

Mark Mueller currently works as a forecaster with the Colorado Avalanche Information Center providing highway avalanche forecasts to the Colorado Department of Transportation at Wolf Creek and Monarch passes in south central Colorado. He serves as Executive Director of the American Avalanche Association. He is almost as old as The Avalanche Handbook; he too turned 50 this summer.

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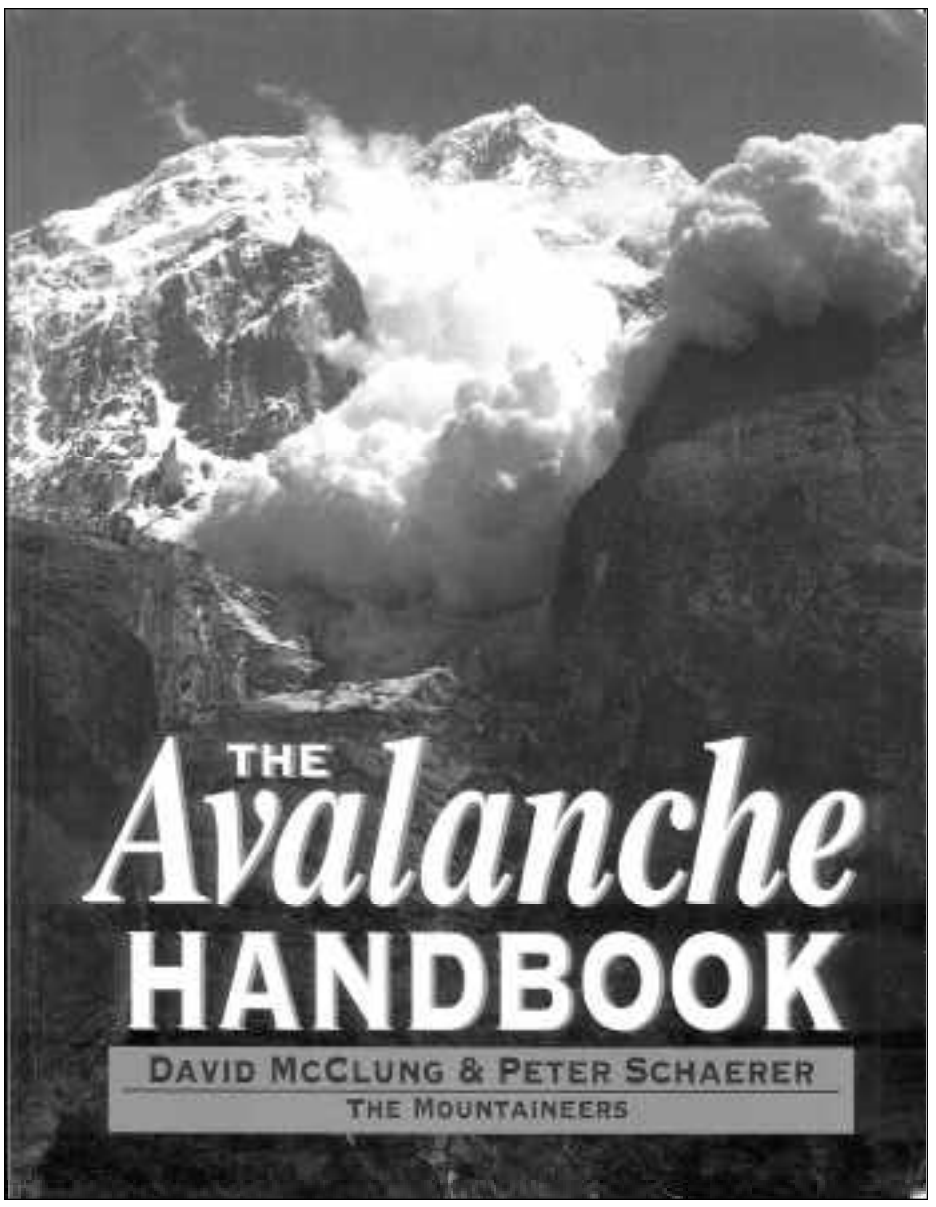
1975 Avalanche Handbook

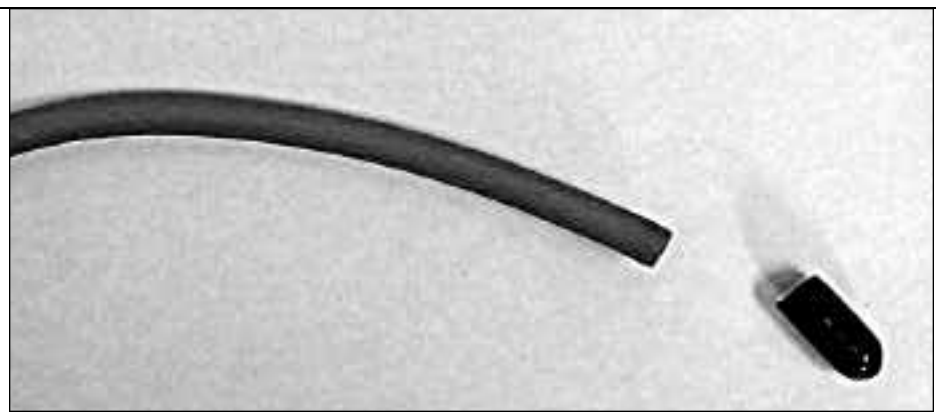


1993 Avalanche Handbook

EDUCATION

Increasing Explosive Safety at Snowmass

By John Brennan



Avalanche hazard mitigation at ski areas throughout the world relies on the use of explosives. Even so, as a user group, our annual consumption of explosive products is very small compared to the mining industry. In recent years, explosive manufacturers' liability concerns have forced many in the United States snow safety industry to purchase initiating products from foreign suppliers. In addition, as recently as last Fall's meeting between the National Ski Areas Association's (NSAA) Explosive Committee and the International Society of Explosive Engineers (ISEE), disagreements regarding explosive protocols continue to plague our industry. Naturally, a proactive approach to safety serves our best interests. The following are my recommendations for increased safety with explosive systems as used at the Snowmass Ski area.

Electrostatic Discharge

Electrostatic discharge (ESD), more loosely known as static electricity, has been a concern to explosive users since the 14th century[1]. Back then, black powder users strove to prevent ESD from causing pre-ignition at seaside forts. More recently, owing to at least one ESD accident, Canada mandated the use of static shunting staples on all cap/ fuse assemblies[2]. These shunting staples provide a preferential pathway to ground for the ESD. The fuse powder used at the time of the accident in Canada was conductive. They have since changed the type of powder to a non-conductive core. Although not mandated in the U.S., in part because United States fuse manufactures never used a conductive core, it is interesting to note that all the pre-assembled cap/ fuse assemblies being imported by Petro-Explo have these staples installed[3]. The core of their fuse trains is described as 'semi-conductive.' This may be a truer description of a core of fuse powder since it is made up of carbonaceous material and salts.

Examples of Static Generation[1]
Typical Voltage Levels Means of Generation 10-25% RH 65-90% RH
Walking across carpet 35,000V 1,500V
Walking across vinyl tile 12,000V 250V
Worker at bench 6,000V 100V
Poly bag picked up from bench 20,000V 1,200V
Chair with urethane foam 18,000V 1,500V

As compared to other items in the table showing static generation, blowing snow can generate readings in excess of 20,000 volts[4]. Rotor wash during heli-bombing has its own inherent static concerns. As a reference, the ESD 'shock' on the human body needs to be around 3,000 volts before it can be felt[i]. Bottom line voltage values and sources necessary to cause pre-detonation are elusive as many factors can contribute to pre-ignition: relative humidity, the conductivity of the powder train, the fuse's outer coating, and the sensitivity of the detonator's initiating mixture[ii]. Many detonators use lead styphnate as part of the initiation mixture, and this compound is known to be extremely sensitive to ESD.

To keep static from entering the fuse train, traveling through a conductive black powder train and reaching the potentially ESD-sensitive detonator, Ron Thomas of Ensign-Bickford recommended simply taping over the exposed end of a cap/ fuse assembly[iii]. For operations that build a sizeable number of cap/ fuse units, this taping process is laborious and slow. A simple solution is to use a Poly Vinyl Chloride (PVC) nipple over the end of the cut fuse. The PVC nipple not only effectively eliminates the fuse's internal pathway for static, but it also keeps the moisture-absorbing black powder fuse train dry.

As Russ Johnson commented in the 2001Fall Issue of The Avalanche Review, stringent explosives use protocols "revealed a dramatic drop in the re-light and no-light dud statistics." Keeping the fuse train as dry as possible and crimping off a 4-inch section of fuse prior to placing the pull wire igniter surely leads toward these favorable statistics. For operations where a minimum fuse length or burn rate are mandated or desired, this crimp cut needs to be considered. A snug fit is achieved with a PVC nipple that has a .187 inch inner diameter by .5 inch inner length. These units sell for less than two cents each when purchased in quantity[iv].

The electronics industry has a long history of financial woes due to ESD. One of their simpler and least expensive deterrents to ESD damage is to package susceptible componetry into static shielding packages. For the avalanche community, this can be as simple as placing cap/ fuse or primed boosters into these sacks[v]. Conveniently, these bags can also accomplish the segregation of the primers from other equipment inside a route pack- a State regulation in Colorado[vi].

Thermalite Connectors

It should be noted that Petro-Explo imports pre-assembled cap and fuse units that may have a Thermalite igniter cord connector crimped to one end. This unit is painted red to differentiate it from the detonator. These igniters are so heat sensitive that simply holding a lit butane cigarette lighter under them for a few seconds can cause an initiation. For comparison, a freshly cut piece of Safety Fuse in the best condition needs to have the flame held against it for almost 10 seconds before initiating. Common sense certainly dictates removing any type of pre-installed igniter before arming your shots. Likewise, NSAA Explosive Guidelines and certain State Regulations mandate it. After the Thermalite igniter has been removed, the PVC nipple can be installed.

Double Capping

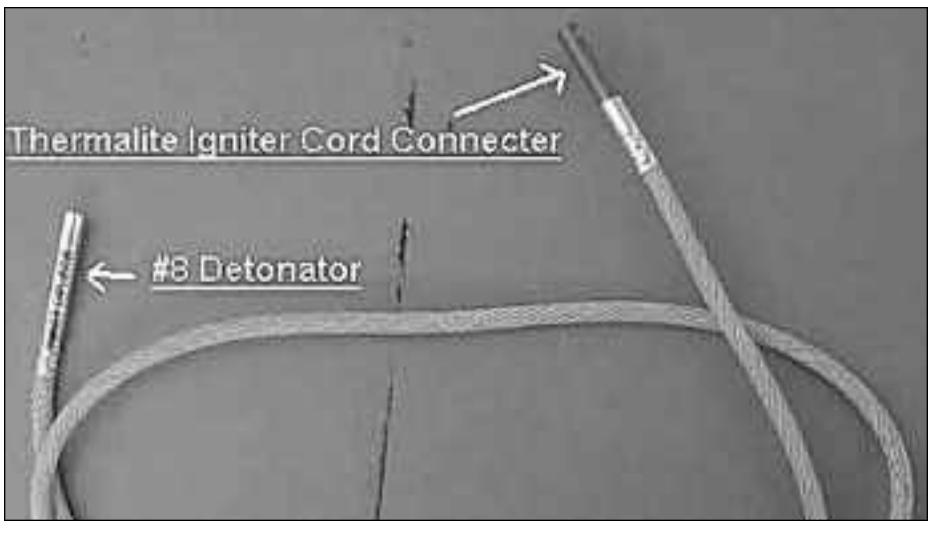
For those operations that are double capping without the benefit of using cast boosters manufactured with two cap wells, there is a temporary solution. One cap/fuse assembly may be inserted into the cast booster capwell and the fuse taped to the outside canister of the unit. The other cap/ fuse units can be installed in the "through tunnel" and the fuse taped to the outside. This procedure has been mentioned as a reliable method of detonating certain cast Pentolite charges[7]. Extreme care must be exercised when using this temporary procedure as there is potential for having the shock-sensitive detonator extending out the end of the primer. A small cork can be purchased and placed into the unarmed charge effectively sealing the through tunnel. Once properly placed, taping over the exposed end of the 'through-hole' or cork will prevent the possible entrance of foreign material during transport to the blast site. Before using this described method, it is wise to contact the manufacturer of the explosive to insure that their boosters will detonate in this manner. The best solution to arming with two detonators is the use of a cast booster that is designed to accommodate the two detonators.

I am very interested in ongoing research or opinions regarding these topics. Reach me at: jbrennan@aspensnowmass.com

John Brennan is Snow Safety Director at Snowmass Ski Area and a consultant to Las Leñas Ski Area in Argentina. He is also a State licensed Blaster, a member of Colorado's Chapter of the ISEE, and a Professional Member of AAA. He began patrolling at Snowmass in 1992 and received the Dale Gallagher Memorial Scholarship to the National Avalanche School in 1993.

End Notes:

1 Electrostatic Discharge Association, http://www.esda.org
2 "In Defense of Safety Fuse," Society of Explosive Engineers, Fred Hynes
3 Personal communication with James Kirkland, Petro-Explo, 2/02
4 Personal communication with R. A. Schmidt, 2/02
5 Personal communication with Doug Smith, 1/02
6 Personal communication with Richard Bowes, Canadian Explosives Research Laboratory 2/02
7 Personal communication with Ron Thomas, Ensign-Bickford, 8/02
8 Harmon Corporation, http://www.harmancorp.com
9 Allied Electronics, http://www.alliedelec.com
10 Colorado State Division of Labor Explosive Regulations



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The NAC chaired the annual Avalanche Artillery Users meeting in Truckee, CA in May. The NAC and the Artillery Users cooperate to assure there is an adequate supply of military artillery and ordnance in the short term and to ensure there are alternatives to the dwindling supply of military artillery in the long term.

The NAC also provided information about military artillery and hand-delivered explosives to Homeland Security, consulted with several ranger districts on winter recreation projects proposed in avalanche terrain, provided staff support for a national assessment of the FS avalanche program, and had the good fortune to work with the Snowbasin ski patrol and snow safety department both before and during the Olympic Games. We at the NAC are looking forward to another great winter.

— Doug Abromeit

Bridger -Teton National Forest Avalanche Center

Fall overstayed its welcome for a third straight year in the Tetons. The snowfall from a decent mid-October storm turned to concrete during six weeks of glorious sunshine and mild temperatures. By late November, this hard surface had receded to upper elevations and shaded northerly aspects. In early December, winter finally arrived and by Pearl Harbor Day, we were in the midst of a deep slab cycle. Most of the wind-loaded avalanche paths that were underlain by the October crust slid, many with four to eight foot crowns.

As December progressed, enough snow accumulated at mid and upper elevations to limit faceted crystal development and bridge any lingering deep-slab instability. Several storm cycles during January and March initiated surface slab activity in mid and upper elevation starting zones. At the lower elevations, a shallow, faceted December snowpack failed when new precipitation events finally arrived. The underlying facets were responsible for slide activity again when temperatures warmed in the spring. Temperatures were cold from December to mid-March; our upper elevation station recorded the lowest average temperature in 36 years during this period. End of the season precipitation totals were only at 80 to 85 percent of normal.

In March, a lone backcountry skier and a lone 16-year-old snowmobiler died in separate avalanche events. Live self-rescues occurred in January in the Salt River Range when a snowmobiler was dug out of eight feet of debris and in February when rescue breathing resuscitated another snowmobiler completely buried except for a small portion of his helmet. A number of partial burials and close calls were reported.

We installed five new backcountry weather stations in early November. We incorporated these instruments into our existing network of ski area weather stations using spread spectrum radio communications. The data from these stations, observers and field reconnaissance missions enabled the Bridger-Teton Avalanche Center (BTNFAC) to provide new daily avalanche advisories for the Continental Divide Trails / Togwotee Pass and Southwest Trails / Greys River areas. These stations were installed with funding provided by the Wyoming State Trails Program. Additional stations will be installed over the summer as Phase II of this project.

With the help of an intern, our staff was able to complete the entry of 23 years of historical data with nearly 10,000 avalanche events into a data management program. The program was designed by Chris McCollister, a graduate student at Montana State University. This program will use a modified meteorological, nearest neighbor approach and Geographical Information System (GIS) technology to visually explore regional spatial patterns of avalanche activity. The BTNFAC also participated in a project with Chinook Engineering of Sheridan, Wyoming to determine the feasibility of detecting infrasonic sound signatures generated during avalanche events.

Our staff of avalanche specialists, Jim Springer, Mike Rheam and Jim Farmer, was very busy with the expansion of our daily forecast into the new areas. The BTNFAC program benefited greatly from the expertise of Ray Spencer, who joined the Teton Division as our Winter Sports Administrator. To top things off, phone calls and web hits to our daily advisories were up 60 percent over last year's counts.

— Bob Comey

Colorado Avalanche Information Center

The CAIC is a program within the Colorado Geological Survey, which is a good fit because Colorado State statutes define avalanches as a geologic hazard. Our mission is to provide education and forecast services for transportation (Colorado Department of Transportation), the ski industry, and backcountry users. We operate five offices around the state with a staff of 13: Boulder (staff of 6); Eisenhower Tunnel (2); Western Slope (1); Silverton (3) and Pagosa Springs (1).

The 2001-2002 season began with a thin, patchy snow cover for most of November and no avalanche danger. A large storm at the end of the month, in which Vail got 55" on November 23-27, finally got the CAIC in business. This storm also led to the first avalanche death of the season: on November 28, a slide swept a backcountry skier near Eldora (west of Boulder) into a lake, where he drowned.

December brought widely varying snows to Colorado's northern mountains (63-120% of normal), while the central mountains were below normal (62-82%). The southern mountains were above normal (110-140%), but this would be the only month of the season for that to happen. In all mountain areas, the storms were small, and avalanche activity was sporadic and unexciting.

January did no favors for skiers, 'boarders, and 'bilers, as storms were few and snowfall scant—75-100% in the northern mountains, 45-90% in the central mountains, and 30-60% in the southern mountains. The backcountry snowpack rapidly turned to sugar.

February was equally dry: 62-100% of normal snowfall in the northern mountains, 27-61% in the central, and 26-71% in the southern mountains. Good storms were conspicuously absent. The snowpack became as sugary and weak as anyone could remember. There were seven avalanche incidents reported, and three were fatal. On February 1st, a skier died outside the boundary of Aspen Highlands in a very small, facet-loose-snow slide. On February 6th, a backcountry skier died in a hardslab avalanche on Crystal Peak between Crested Butte and Aspen, and on February 24th, a snowmobiler died while highmarking near Sunlight.

In March, finally a storm! On the 8th-9th, 20-35" fell in the central mountains, and 12-20" in the San Juans. That was more than the house-of-cards snowpack could stand, and the avalanches began. The cycle had mostly ended by the 13th, but the snowpack was still easily producing triggered avalanches. And that's when the trouble began: four avalanche deaths in four days. On March 14, a backcountry skier died in a slide near Ashcroft, 10 miles from Aspen. Also on March 14, an out-of-bounds skier died at Aspen Mountain, and on March 15, two out-of-bounds snowboarders at Telluride triggered a large avalanche. One died and one was severely injured. On March 17, a snowmobiler highmarking in the Flattops was buried and killed. March snows, like previous months, were slim: 40-89% of normal in the northern, 72-120% in the central, and 48-72% in the southern mountains.

The CAIC closed on April 21. The dry pattern had continued, with almost no snow added to the snow cover, and warm temperatures were making it disappear at a record rate. Here's a rundown on percentage snowfall for the core months of December–March:

Northern mountains: Steamboat, 100%; Copper Mt., 100%; Beaver Creek, 86%; Loveland, 86%; Breckenridge, 81%; Berthoud Pass, 76%; Winter Park, 75%; Bear Lake, 71%; Vail, 70%; and A Basin, 62%.

Central mountains: McClure Pass, 89%; Aspen Mt., 73%; Crested Butte, 73%; Aspen Highlands, 64%; Gothic, 57%; and Monarch, 56%.

Southern mountains: Telluride, 74%; Red Mt. Pass, 64%; and Purgatory, 49%.

Some areas had not been so dry since 1976-77.

The season confirmed a basic truth: dry years can be deadly years. Once slab covered the omnipresent depth hoar, there was nowhere to hide. There were eight avalanche deaths in Colorado, two more than average. There were many close calls that easily could have put the toll into double figures.

Finally, to end on a positive note, the CAIC staff taught at 80 schools. About 3,000 people attended classes and on-snow seminars. To our knowledge, none of these participants was among the avalanche victims.

— Knox Williams

Gallatin National Forest Avalanche Center

Just like clockwork, our first reported avalanche incident occurred with the season's inaugural snowfall. On October 13th, a skier, hungry for the first tracks of the winter, was caught in a small slide in the Bridger Range. As always, we were hopeful that this was the start of a legendary winter. We had to settle for mediocrity, as November remained dry and warm.

December was a mixed bag, with

our southern areas getting over four inches of water while in the northern areas the snowpack remained anemic. Unfortunately, at Christmas time we received an unwelcome gift of surface hoar. Around West Yellowstone, this layer was promptly buried and caused us heartburn for the next two months. January had huge storms with two dumps measuring close to 30 inches in the Bridgers. A few days of warm temperatures in January formed ice crusts on south facing slopes that laid the groundwork for lingering instabilities—especially once a layer of facets capped this crust in the Cooke City region. This layer was responsible for two fatalities as well as numerous other human triggered slides all the way to our season's end. February and March were cold and snowy with some of our southern mountains getting over nine inches of water in March! As you can imagine, we had some sizeable avalanche cycles following these storms, with people getting caught in slides. Luckily, all those involved escaped any harm. We sat around on the edge of our seats in April anticipating large dumps, but managed to quietly end the season. Snowfall continued well into May.

Unfortunately, Montana led the nation in avalanche fatalities with nine this season, all of them snowmobilers. In southwest Montana, we had three fatalities in our forecast area. A double fatality occurred in mid February outside Cooke City when five snowmobilers, all on the same slope at the same time, triggered a slide. Sad to say, none were wearing avalanche transceivers, and the two completely buried riders died. The other fatality happened in Idaho, near the Montana border, outside West Yellowstone. This rider was wearing a transceiver but was buried at an unsurvivable depth of 20 feet. Not to be overshadowed by these fatalities, there were plenty of success stories out there. This year we heard about three live recoveries of completely buried people using avalanche transceivers, two of them involving rescuers who had avalanche training.

Unlike the bony last two years, this winter ended up being closer to average. In April, we ended the forecasting season with snow depths at 85-90% of normal, and snow continued into May. This snowfall was good news for our parched landscape. After a few false starts to the season, we opened up for business on December 1st and closed on April 14th, providing 130 advisories. Our email subscription service continues to be popular, and in conjunction with the web and phone lines, almost 1,300 people a day either heard or read the advisory, a 16% increase from last year!

Our education programs continue to be popular. This year we gave 62 talks / seminars or field sessions to over 2,700 people. We talked to search and rescue groups, all the seventh graders in Bozeman, MSU students, trail groomers, and various ski and snowshoe clubs. Additionally, we increased our presence within the snowmobile community through multi-day courses offered in Bozeman and West Yellowstone. These were a huge success, and coupled with numerous one-hour lectures, we reached a record number of riders. Once again, Polaris and a local snowmobile shop donated two sleds for us to use this winter.

— Doug Chabot

Glacier Country Avalanche Center

For Northwestern Montana, the winter of 01-02 was one a bit outside the normal box. Instead of the mostly cloudy conditions with relatively consistent temperatures and steady snowfall that we normally experience, the weather was characterized more with variable clearing, intermittent heavy snowfall, and widely fluctuating temperatures. This pattern produced snowpack instability that persisted for long periods. We saw a significant number of avalanche cycles. Numerous backcountry parties got mixed-up in snow slides. Unfortunately, the region contributed two fatalities to Montana's record setting count of nine snowmobiler deaths. The cool, northerly weather pattern that developed in February persisted into the spring, with substantial and erratic new snowfall even in June.

The avalanche center continued to offer its normal program of avalanche advisories and education classes. Glacier Country Avalanche Center, Inc. — the non-profit side of the program — hosted an American Avalanche Institute level II class, along with numerous transceiver clinics. All were well received. The non-profit totally redesigned the shared web page, adding new pages posting calendar events and observation and accident reports. The Forest Service received another substantial Montana Fish, Wildlife, & Parks trails grant for avalanche education. Our plans for next season involve streamlining our advisory format.

— Stan Bones

Idaho Panhandle National Forest Avalanche Center

Northern Idaho had plenty of storms and was fortunate not to have any fatalities this past year. During the season, we had a few reports of triggered releases but no injuries. As of April 29th, we were still at 130% of average for snowpack.

Kevin Davis was again responsible for conducting weekly snowpit observations on the North Zone. He also wrote and posted most of the weekend updates for this year. We posted 20 weekend advisories on the Forest Service website. We rated the danger as MODERATE 12 times, CONSIDERABLE four times, and HIGH avalanche danger was listed four times. Internet hits totaled over 4,200, and we counted 170 hotline calls.

We welcomed Ed Odegaard to our program this year, who works down on the St. Joe District. In the past, we didn't have any avalanche information available from this area. Ed attended the National Avalanche School in Jackson, Wyoming and the Phase II at Crystal Mountain in Washington. He developed and showed a PowerPoint presentation on natural avalanche path recognition on the St. Joe District and conducted weekly snowpit observations on the district. Tom Sudul from the Coeur d' Alene District assisted Carol Johnson from the Lolo NF with snowpit observations in the St. Regis Basin again this year. Funding wise, we zeroed out our earmarked account and were able to receive additional support from Recreation dollars in order to cover the program for the final part of the season.

The following is a list of avalanche presentations that we offered throughout the Panhandle region:

Presentation to private group - Spokane (12 participants); Kootenai County Search and Rescue - Coeur d' Alene (10); Private group at Mountain Goat Outfitters - Spokane (12); Avalanche Awareness, St. Joe District (15); Backcountry Safety at North Idaho College - Coeur d' Alene (30); Idaho Fish and Game - Coeur d' Alene (10); Georgia Pacific Foresters Conference - Coeur d' Alene (25); Avalanche Awareness, Forest Snowmobile Training - Priest Lake District (12); Snowmobile Avalanche Awareness - Sandpoint (20); Workshop for U.S. Border Patrol - Bonners Ferry (12); Workshop at Sandpoint Marine (15); Workshop at Ponderay Yamaha (35); Field Session with Rocky Mountain Academy (12); Field Session with Rocky Mountain Academy (10); Sandpoint District Safety Meeting Avalanche Awareness (25); Display at the Banff Mountain Film Festival

— Bob Kasun

Mount Washington Avalanche Center-White Mountain National Forest

We wish we could say the biggest news this year was the tremendous amount of snow we received, but it didn't happen. Though we were geared up for another big snow year, the jet stream just didn't cooperate. We did start the season early with snow accumulations in early November that resulted in our posting general avalanche advisories beginning November 9th. We started daily forecasting seven days a week near the end of December. Though it was a mild winter, the avalanche cycles remained consistent in January. February normally brings a lot of snow, but this year it remained relatively dry and warm. At one point, it reached 42 degrees during the middle of the month. March didn't get much better, with continual lean snowfall averages. We were getting ready for an early end to the snowpack when April came and turned that around. We received snow almost everyday, which resulted in the snowpack reaching near normal depths. Snow continued to fall through May resulting in "Considerable" avalanche danger ratings on many days. Nonetheless, the annual spring skiing ritual brought thousands of skiers and riders to Mount Washington. The conditions brought new meaning to "the human factor."

Along with numerous climbing and skiing accidents, we had approximately a half dozen human triggered avalanche events. Eight people were at least partially buried in three of these incidents, the first occurring in early November and the last in May. Luckily, in all three incidents, the victims were able to successfully self-rescue or had bystanders nearby that witnessed the event and dug them out. Injuries in all events were minor.

Fifteen avalanche courses were held in the local area. Over 200 people attended these courses. Our Snow Rangers participated in the field portion of most classes and some of the classroom portions. Along with helping with snow pits, transceiver practice, and rescue scenarios, we were able to conduct many dog search scenarios. Our German Shepherd, "Tuckerman," and our Yellow Lab, "Cutler," were able to get good field time with all the avalanche courses. We were all surprised at how eager and willing the course participants were to be buried for our dogs.

"Tuckerman" — Brad Ray's German Shepherd — was also back on the mountain this year along with Brad. Our program started the season short two Snow Rangers and in March, Marianne had to stop coming up the mountain, as she was seven months pregnant. So Brad came back to help us out. We are thankful for his willingness to come out of retirement for the season. When Brad retired last June, Chris Joosen filled the position as Lead Snow Ranger after being Brad's Assistant for seven years. Brian Johnston, our newest Snow Ranger, came on board mid-winter. We are excited to have him as part of the team. Brian brings a lot of rock and ice climbing experience, technical rescue, and avalanche knowledge of the area to the program. We hope to be fully staffed by late fall.

The "Friends of Tuckerman Ravine" held their second annual "Son of Inferno" pentathlon (run-kayak-bike-hike-ski) relay race to raise funds for the Avalanche Center. Once again, it was beautiful on race day, so participation and spectator turn out was excellent. The money from this fundraiser is slated to go towards increasing avalanche and alpine stewardship education efforts.

With the late snowfall, "spring" skiing lasted into July. And yes, the die-hard skiers were there even though it was alpine ice pitched at 45 degrees. Until next winter, have a good summer.

— Chris Joosen

Northwest Weather and Avalanche Center

For the NWAC, 2001-2 was a season of heavy snowfall and many avalanche accidents, but no fatalities!

Weather and avalanches: Generally, sites in the north Cascades ended up with normal snow depths, similar to Mt Baker. Sites in the south ended up with greater than usual snow depths, similar to Mt Hood Meadows. See the two graphs for details of snowfall at the two sites.

The Northwest had three major snowfall cycles during the 2001-2002 season, along with many other individual storms. The first major cycle occurred between Thanksgiving and December 21st. Cumulative snowfall during this time ranged from 150"-250" at some sites, which eliminated early season depth hoar problems. Mt Hood Meadows had 32" in 24 hours ending the morning of December 5th, with a 20+ foot natural fracture was seen nearby on that day. A particularly close call occurred November 24th at Paradise on Mt Rainier. One of a pair of snowboarders, without a beacon, was buried with only a dime size portion of his boot showing. His partner found him and dug him out after about five to six minutes.

The second major cycle came between mid January and early February. Cumulative snowfall during this period at several sites was another 150"-200". Coincidentally, Washington's first Avalanche Awareness Week was declared for 21-27 January. There was a slew of accidents during this time, several at Stevens Pass, and it was a miracle no one was killed. Two campers decided to head for avalanche central at Source Lake at Snoqualmie Pass on January 24th and were partly or completely buried in their camp that evening. One was able to dig out the other, and they walked to Alpental with stuff sacks on their feet. Perhaps more remarkably, a woman snowshoeing with her dog at Gold Creek at Snoqualmie Pass was completely buried. Although the dog had no avalanche training, it dug her out and saved her life. At Crater Lake, a party of four searchers was caught in an avalanche with one person half buried, headfirst. Another was buried five to six feet deep for 30-40 minutes.

The third major snowfall cycle came during the first half of March with snowfalls at higher elevation sites ranging from 120"-150". On March 10th, a climber triggered an avalanche during a warming trend and went for a 1,500-foot ride on Granite Mountain, then was buried for approximately 20 minutes. His partner took time to call for help on a cell phone before he began digging. An avalanche hit two snowmobilers on March 18th on the road to Stampede Pass. Snowfall rates reached 2-4 inches/hour late on March 19th. Crews from the Washington State Department of Transportation could not keep up with loading rates and natural avalanches hitting the highways at Stevens and Snoqualmie Passes; they closed both passes from the afternoon of March 19th to the afternoon of March 20th.

Outreach, office and other info: Direct forecast and data accesses to the NWAC web sites numbered 1.6 million this season, up 45% over 2000/2001. Roland Emetaz and Ken White helped reach approximately 2,600 people at Avalanche Awareness talks. Several TV interviews throughout the season went out to large audiences. The Friends of the Northwest Avalanche Center (FOAC) held several events this season. The most spectacular was SnowBash 2002, with music and door prizes. It was co-hosted by former NWAC forecaster Rich Marriott, who is now a local TV celebrity. SnowBash 2002 raised several thousand dollars to help the FOAC support the NWAC. The biggest change in the office is replacing the 15-year-old software for communicating with our weather station data loggers. We will now be using Campbell PC208W software. Old avalanche software dies hard. The weather station network now contains 36 data loggers at 20 different areas.

Annual budget woes and opportunities: Budget problems seem to return to the NWAC each spring with astonishing regularity. 2002 was no different, with the Washington State DOT and the US Forest Service both declaring their intent to lower their contribution levels for 2002-2003. We have been pursuing other sources to make up the shortfalls, including Payment to Counties funds, otherwise known as Title II and Title III. Ironically, the Forest Service and the Park Service are also asking the NWAC to offer new, expanded mountain weather forecasting services in the spring, using new monies from Fee Demonstration funds. Recent accidents on Mt Hood and especially Mt Rainier, where three people died due to stormy weather, may bolster the proposal for this expansion. If this change happens, we might be able to add another forecaster to the staff, which would allow each of us more field time, and allow each of us a mid-winter break.

Overall it was a great season, and with a cool spring there was still plenty of snow in the Cascades for ski touring, even near the end of June! We look forward to seeing everyone at ISSW in Penticton next fall.

— Garth Ferber

Payette National Forest Avalanche Center

SNOW!!! Overall, by late April we were just above the 30-year NRCS average for the area. We received at least some amount of snow 25 of 31 days in December. The PNFAC started issuing weather-related information bulletins on November 29th and began issuing twice weekly avalanche advisories (Wednesdays and Saturdays) on December 12th. We issued one avalanche warning on December 14th.

We had an early January thaw with a rain on snow event the 5th and 6th. For the most part, it continued to snow and forecasting focused on new snow instabilities as well as tracking the rain crust. One avalanche warning was issued on January 31st with a natural release cycle that ran on the rain crust/facets of early January.

Snow began to taper off after the first week of February, with new snow about once a week or so. We dug deep for the first two weeks to look for the deep slab instability of late January.

Spring storms in late February and into March brought intermittent new snow instability problems and occasional wet snow avalanches. Our last avalanche advisory was issued March 30th to close out the year, although there was still plenty of snow around for riding and sliding well into April.

Accomplishments:

Issued thirty avalanche advisories and two avalanche warnings.

Conducted two avalanche transceiver workshops, four 2-day avalanche awareness clinics, two avalanche awareness presentations to 250 students and hosted one avalanche forecasters' workshop.

Established the website link from the Payette NF to the avalanche.org website and completed a hotlink on the PNFAC web page to the Granite Mountain remote weather station.

We received great support from the Friends of the Payette Avalanche Center in the form of a $1,500.00 donation that we used for additional memory for our phone recorder and supplies and equipment for forecasting needs. The Adams County Sheriffs Office also donated $1000.00 to the Friends organization this year.

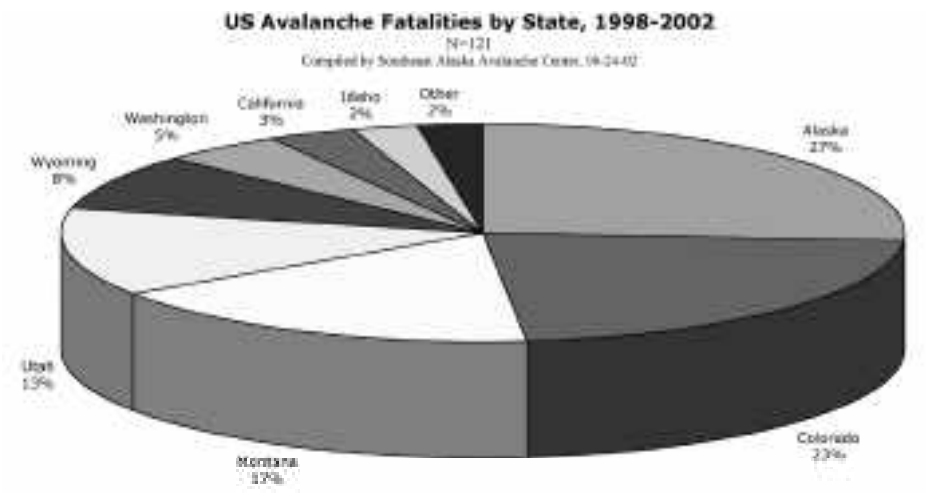
— Jeff Gildehaus

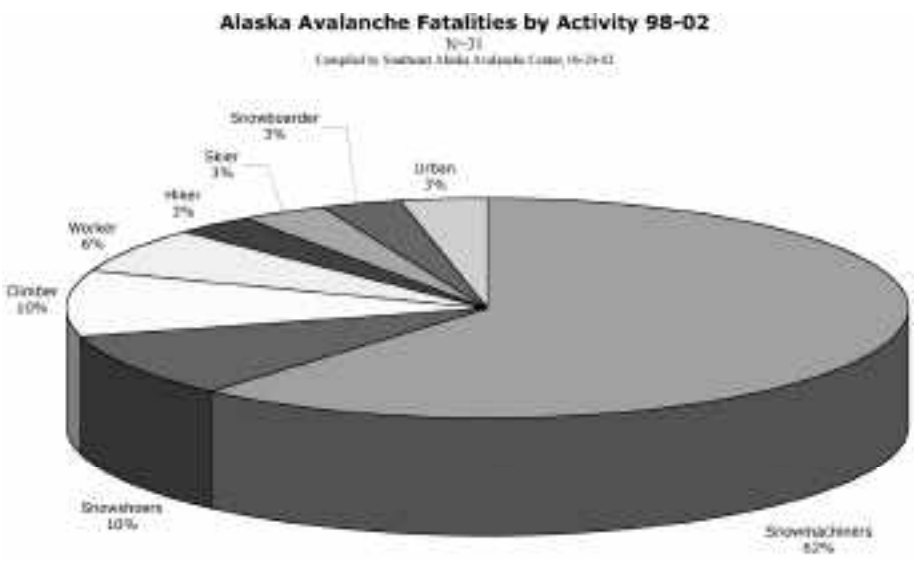
Sawtooth National Forest Avalanche Center

Formerly called the Forest Service Sun Valley Avalanche Center, we became the Sawtooth National Forest Avalanche Center (SNFAC) last fall. The change was to alleviate any confusion with Sun Valley Company snow safety and to better portray our relationship as a Forest Service operation.

Due to the early season snow in the mountains, general information advisories began in the end of October. Daily advisories did not begin until December 8th, and they ran through March 31st. April had such consistent spring conditions and clear weather that only general snowpack and weather information was posted each Monday and Friday until the weekend of April 15th. We issued 125 advisories.

November 2001 brought a clear, warm spell that melted all of the early autumn snowfall except on high elevation, northerly aspects. Our next snow did not appear until just after Thanksgiving, and then winter began in earnest. Snow conditions were excellent and quite stable in all locations except for the uppermost north facing slopes. By mid December, cold temperatures, wind and sporadic snowstorms increased the avalanche danger and fooled a few backcountry travelers. Cold temperatures and very little snowfall from mid





December through mid January produced a seriously faceted snowpack. Subsequent storms produced a series of avalanche cycles in the latter part of January. In February, conditions stabilized due to a lack of significant snowfall, and surface snow conditions were surprisingly good. The next notable avalanche cycle occurred towards the end of March, when we shifted from record-setting cold temperatures to near-record heat. In April, the snow pack began to consolidate, and generally clear weather brought excellent corn snow conditions in most areas. Weak, faceted snow in a number of locations required paying close attention to the surface freezes and the underlying snowpack until after mid April. Excellent spring conditions lasted well into May in the high country.

Overall, the SNFAC had a successful season. This success was represented by no fatalities, only a few injuries and close calls, and once again, a dramatic increase in avalanche awareness throughout the local community. Large, attractive banners were posted along the highway, at shops and at FS ranger stations. They displayed the hotline phone number and www.avalanche.org for passing motorists.

The Center held twenty-five classes with over 700 participants. Hotline calls were up, and the local media gave a lot of coverage to avalanche awareness and conditions. We released our new web pages and e-mail service in mid March and received great comments about all of these efforts. End of the season advisory totals were 25,000 hits and calls. The breakdown was: 8,000 calls for our hotline, 15,100 hits on our Internet advisory, over 900 e-mails sent, and 625 faxes sent. In addition, we received 16,300 hits on our home page.

The Friends of the SNFAC moved beneath the AAA umbrella along with several other Friends groups. This arrangement has been very successful and much appreciated for the local group. The Friends continue to raise funds with the annual Snow Ball and mail campaign, and help support the avalanche center's operations.

Funding is an ongoing struggle, although the SNFAC was able to get on the "radar screen" of the Sawtooth Forest and BLM this season as an important operation. We hope to garner additional financial support as the demands for and recognition of the Avalanche Center's services continues to grow.

— Janet Kellam

Shasta-Trinity National Forest Avalanche Center

Education and Advisories: The 2001-2002 was Mt Shasta Avalanche Center's fourth official season as a type II regional avalanche center. The Center provided avalanche information and education to a population starving for avalanche information in the northern-most area in California. Our goal this last season was to provide information and tools that assist people in making decisions within their comfort zone for safe winter travel. We met our goal through interactive classes, field sessions, and daily advisories via the web/telephone, and media interviews.

The Mt. Shasta Ranger District encompasses three distinct recreational areas: Mt. Shasta, with elevations ranging from 3,500' to 14,162'; The Eddies, 3,500' - 9,000'; and Castle Crags to the Trinity Divide, 2,500' - 6,500'. We generally broke our forecast down into elevation zones. The total area is approximately 60 square miles

We issue climbing advisories year round and issue avalanche advisories from November through mid May. We utilize a complicated phone system, and we felt that we had accomplished a fair amount when it was finally operational. Our web page has been on-line since December 1998. We recorded over 48,440 hits to the web page this past year, with 20,400 for the avalanche advisory. In addition, we received 3,526 phone calls to the hotline.

Awareness classes were held through College of the Siskiyous, California State University of Chico, The River Center, Mt. Shasta Ski Park, and various outdoor stores, as well as through the Forest Service. Classes were very successful, with high attendance and students were eager to learn. The educational programs placed us on the road one to two days a week from the Bay Area in California all the way to Medford, Oregon.

In the future, we would like to expand our education program, weather information, and the extent of the forecast area. We feel very fortunate to have both public and U.S. Forest Service support to continue providing a quality and professional program for the public. We would like to receive more education pertaining to the unique weather phenomena that occurs on Mt. Shasta, and we would like to expand our snowmobiler educational programs. We look forward to the winter ahead, and in continuing to provide a professional and quality product.

Weather and avalanches: Our winter started off cold and stormy, with November and December bringing in half of the seasons' snow and water. In addition, wind events during those early months brought us our largest avalanches of the season. Although our snow and water season totals were close to normal, warmer and drier conditions in January and April brought the snowpack to below normal levels. Normal amounts of natural and human triggered avalanches occurred during the season, with no known human injuries or fatalities.

Month	Snow	Water
November	81"	7.68"
December	110"	11"
January	30"	5.21"
February	64"	5.97"
March	57"	3.85"
April	17"	1.72"
May	25"	2.30"
7 Months	384"	37.73"

— Matt Hill

Southeast Alaska Avalanche Center

At the end of April, Alaska had recorded eight avalanche deaths for the season; five victims were snowmachining, and three were snowshoeing. None were in our Southeast Alaska region. As I write, we are still in the middle of the spring heliskiing season, and the climbing season is just beginning. An additional three deaths occurred in June when one climbing party was caught in a slide on Mount Foraker during difficult snow conditions. The season total of 11 fatalities in Alaska continues to lead other states' totals. An additional and quite serious concern in Alaskan cities and communities is the possibility of urban avalanches. The potential exists for large numbers of fatalities and building destruction.

Our staff has expanded to two avalanche specialists with the addition of Peter Carter. We also have student intern Kent Scheler, field assistant Ganesha Howell, and administrator Heather Glude working with us. Sarah Carter and Tamar Young were trained in midseason as avalanche awareness teachers, and taught about a dozen sessions.

We ran a full program of avalanche courses again this season, including our University of Alaska Southeast Level I and a Heliguides' Level II. We attended the January snowmachine races and the Easter sledders' gathering in Haines as a safety presence, doing informal education, and building our riding skills and photo library. We initiated a good start on the major project of overhauling our course curriculum and transferring all our presentations into PowerPoint format. We still have no forecasting budget, but again distributed weekly snowpack updates to an e-mail subscriber list as a stopgap measure. Our weather station and experiments are set up at our Fish Creek Knob study plot.

We continue to fund our operations as a nonprofit by doing consulting work on the side, supplemented by a few small grants, but have worked all winter on obtaining stable government funding. We are making steady progress on local, state, and federal levels, as well as pursuing grants. Mid summer, the state of Alaska allocated $50,000 to the Southeast Center. This funding will provide a computer system, scanners and digital cameras, weather station telemetry, an additional weather station and field equipment. The Department of Public Safety received $35,000 for avalanche education statewide. A significant portion of this funding will go to the Reach and Teach Program, which trains people to teach basic avalanche awareness and sends them out to community groups and schools. The City and Borough of Juneau is beginning to address the real possibility of an urban avalanche. The City received a $10,000 grant to develop an urban avalanche response plan this summer, and has a DC lobbyist working with the Alaskan congressional delegation to secure federal funding for a voluntary buyout of houses in Juneau's avalanche zones. Interest to develop a statewide avalanche center system continues, though funding is the big question.

The winter was an odd one. It began with plentiful early snow in November and December; the an all-out, month-long thaw followed. It arrived and produced our first major avalanche cycle just before Christmas. Snowy weather returned in late January, and produced a second major cycle on a melt-layer recrystallization weakness in mid-February. Then it cleared and cooled for the longest dry spell any of us can remember here. Snowfall and activity during March and April were minimal, and by late April, the spring was still unusually cool and dry. In mid June, at the time of the triple fatality, conditions were reported to be soft and unconsolidated.

— Bill Glude

Utah Avalanche Center - Manti-LaSal National Forest Avalanche Center

Operations for the Winter Season 2001-2002 began with a set back, as the vacancy created by the departure of Faerthan Felix was still unfilled when November rolled around. Through the generous efforts of the UAC and the Wasatch-Cache National Forest, Eric Trenbeath was reinstated as a seasonal employee, and assumed the role of acting Director until the position could be filled. Throughout January and into February, Eric and Craig Gordon performed one man band traveling shows, flying from field days to distant course sites, and throughout their travels posting advisories from motel rooms via laptop computer. Finally, in early February, with the permanent forecaster position still unfilled, the center received approval for a temporary emergency hire, and the expertise of past MLSAC and UDOT Forecaster Dave Medara came on as a welcome relief. This change came at a time of near burnout for Craig and Eric, and Dave was quickly brought up to speed on the Manti Skyline Program. By season's end, Eric Trenbeath was selected to head up the MLSAC.

Unprecedented early season stability followed by one of the driest winters in recent history brought rel-

atively benign avalanche conditions to the La Sal Mountains this season. Though complex layering and rampant depth hoar developed, the much-needed load to tip the scales never arrived. Consequently, most avalanche activity was confined to new snow, direct action avalanches, with events occurring each month from December through March. February brought the only significant old, dry snow avalanches. Wet slides occurred in late March and early April. Local skiers took advantage of the early stable snow conditions by skiing a variety of terrain that usually doesn't even get touched in the dead of winter. As the winter progressed, interest dwindled with the lack of new snow. We received only one report of a snowmobile-triggered avalanche this winter, yet new "Mountain Sleds" were showing up in town all the time.

On the Manti Skyline, the Thanksgiving storm packed a powerful punch, delivering a total of six feet of snow in four days. By the end of December, storms were tracking well to the north, leaving us high, dry, and cold. By early March, an incredibly complex snowpack had developed, and it finally revealed itself in the form of natural and human triggered hard slab releases. A vigorous storm system rolled in on March 8th bringing down the house of cards. Clear skies on the 9th provided a great view of the natural avalanche cycle that occurred throughout the range. Hard slab avalanches could be seen everywhere, with crowns averaging three to four feet in depth; slopes had run close to the ground, and fractures were up to a 1000' wide. A number of backcountry enthusiasts discounted these obvious signs of instability, and at least five human triggered avalanches occurred on the weekend of the 9th/10th with two snowmobilers ending up completely buried. When the season was all said and done, we tallied six known burials with an incredible lack of injuries, and we decided that the Manti Skyline was fast becoming the epicenter for snowmobile- triggered avalanches. Nevertheless, the weekend advisory and free snowmobile avalanche education has been well received by a user group that can benefit by it the most.

Education efforts from the Moab office reached 205 people this year, with a record 37 in attendance for the Moab class. Our snowmobile education efforts reached clubs from the Fishlake National Forest and reached to the Dixie National Forest near Brianhead and Cedar City. We also worked with local search and rescue groups, Outward Bound, and members of local communities. Snowmobile education efforts in northern Utah reached over 500 people. Advisory numbers were slightly down in Moab this season, but in this desert region, folks quickly seek out other activities when the snow isn't flying. 5,904 logged on to our home page, and 8,596 checked our advisory. The Manti Skyline advisory, now in its third year, has shown a steady increase with 10,168 hits this season.

This season has been one of growth and change for the MLSAC, as we have been brought into the Forest Service fold as a welcome extension of the recreation program. In addition to posting avalanche advisories and education, we monitor use, provide visitor contact, maintain trailhead facilities, and strive to minimize conflicts between user groups. We are a small center in a small town, and this fact gives us a unique opportunity for community involvement. It is with this direction that we look forward to many upcoming seasons!

— Eric Trenbeath

Utah Avalanche Center - Wasatch Cache National Forest

Early in the fall, Mother Nature decided to tease all of the Olympic planners with only a few small snowfalls and a fair amount of rain. She got serious late in November as two major storms dropped over 100 inches of snow in the Cottonwood Canyons in a few days. These storms produced widespread avalanching in the backcountry, but because there was very little old snow on the ground, large avalanches were confined to upper elevation, north aspects. Reasonable snowfall continued through the middle of December, creating an incredibly homogenous snowpack.

Although it seemed like our troubles were over, they had just begun. On January 6th, a warm and moist storm plastered the snow surface with a rain/rime crust. This crust sat undisturbed on the snow surface for a week, allowing a significant amount of faceting to occur in the subsurface snow. Minor snowfalls in mid January buried the crust, and a large snow event beginning on January 27th initiated a significant avalanche cycle. During this cycle, an avalanche in the western Unita Mountains buried and killed a backcountry skier.

By the time the Olympics rolled around, we were very aware of the potential for another large avalanche cycle. All we needed was more snow, but that snow did not come until well after all of the foreign athletes had departed. Several days of snow beginning on March 12th triggered another major avalanche cycle on the January 6th ice crust. This cycle included numerous natural and explosive released avalanches, and several large human triggered avalanches, with crowns four to eight feet deep and 300 to 2000 feet wide. This cycle claimed two lives on March 16th when a group of snowboarders left the Brighton Ski Area boundary and triggered a large avalanche above Dog Lake. We continued to see large, hard slab avalanches through the end of March. By April Fools Day, we were in a Utah-style melt down with wet slides and a few "corn slab" avalanches. More large wet slabs released in early April following several nights with above freezing temperatures. We expected more of this type of avalanche activity as the spring warm-up continued.

— Evelyn Lees and Ethan Greene

West Central Montana Avalanche Center

Our advisory season started with a relatively shallow snowpack mid December. As the snowpack developed, heavy accumulations of snow were somewhat localized and unevenly distributed across the advisory area. By the end of December, we had a significant layer of surface hoar on north and east aspects above 6500 feet. Wind and warm temperatures eroded the surface hoar on the south and west aspects before New Years. Conditions had developed which would cause a buried weakness in our snowpack to persist well into the winter. Above average snowfall along with fluctuating temperatures produced unstable conditions during the last weekend in January. On Saturday, January 26th, a group of ten snowmobilers triggered a large slab avalanche while high marking near Missoula. Four of the ten people involved were buried and died.

Advisory Bulletins to the Public:
Approximately 8,000 accesses16 weekend advisories posted:
7,125 web site visits
208 FAX postings
600 phone calls (estimated)

The West Central Montana Avalanche Center responded to a variety of requests for avalanche awareness and education programs this season. Through the cooperative efforts of the University of Montana Outdoor Program, the West Central Montana Avalanche Foundation, West Central Montana Avalanche Center and Kim Sayler of the Missoula Snowgoers Snowmobile Club, 1,677 winter backcountry users attended awareness sessions or educational classes. Participants included young students and adults, skiers, snowmobilers, snow boarders and snowshoers.

— Gene Thompson

Editor's note, from information provided by Dale Atkins of the CAIC: When most centers were writing their summaries, Montana led the nation with nine avalanche fatalities. In June, an accident on Mt. Foraker killed three climbers – all brothers – and brought Alaska's fatalities to 11. There were 35 avalanche fatalities in the U.S in the 2001-2 season, the largest total since 1950 and the fifth largest total in 143 years. The record season follows 33 deaths last season, which was the sixth largest on record.

The June accident on Mt. Foraker occurred on the relatively easy Southeast Ridge of Mt Foraker. That route has now claimed 12 avalanche victims in four separate accidents since 1976. An avalanche on another route killed two climbers in 1992, for a total of 14 fatalities in five accidents on the mountain. Only Mt. Rainer has the dubious distinction of having had more avalanche fatalities. There, 22 people have died in 10 accidents.

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