

AVALANCHE CONTROL PAST-PRESENT-FUTURE

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ABSTRACT: Forecasting for avalanches and applying the information to avalanche control and route safety should start at the beginning of the storm cycle and not end until the snow is gone. The way avalanche control is carried out today has not changed much since it started in the early 1950's. Techniques have changed, such as new delivery systems, new detonation systems and the way weather and snow pack information is evaluated. But, the way we carry out avalanche control and route safety is basically the same.

INTRODUCTION

Over the past ten to fifteen years we have seen large amounts of worthwhile research and development of new ideas and techniques, including, substantial advancements in electronic technologies such as computer technology and potential electronic detonating systems. These new developments are just a progression in the basic ideas and techniques brought into the U.S. in the mid-1940's through Montgomery Atwater.

There have also been improvements in the way we look at information and training in relation to avalanche control routes. The basic procedures of route safety have worked for many years, but even the basics need to be reviewed from time to time.

- What are some of the basics about avalanche control route safety that have remained the same?
- What should be reviewed from time to time?
- What are some of the things that have changed and what are some of the problems that occur with change?

So what are some of the basics about avalanche control route safety that have remained the same?

Most of the avalanche control techniques that were developed by Montgomery Atwater in the early 1950's are still in use today.

- (1) Hand charging- the basic procedure of lighting and throwing a hand charge.
- (2) Ski cutting. This was the method used to initiate avalanches before artillery or explosives were used.
- (3) Artillery. Many programs still use artillery including the Avalauncher.

With good products, good procedures and sound judgment these techniques have maintained reliability in avalanche control.

Procedures learned over time that should be done and reviewed.

- Communication- between you, your partner, and your avalanche control supervisor.
- Inform your partner of your intentions and make sure you get a response.
- Stay in sight of your partner
- Think about some of the more unique or unusual conditions you have seen or heard of on your route. Consider the history of avalanche occurrences and uncommon weather patterns that produce large infrequent avalanches.
- When handling explosives always have the operating plan guidelines in mind and ask yourself "Am I doing everything the correct way?" If you are uncomfortable ask for help, it could save your life or someone else's.
- Training and guiding- this is especially important when you bring new people into your program. Put someone in charge of the new group to help thoroughly train and guide them through the program.

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- Documenting your explosives, weather and avalanche occurrences. This is very important for studies and referring back for case histories.
- When ski cutting know what kind of snow pack is under you.
- Travel Techniques- let the weather and snow pack dictate your route selection. Accidents have happened from doing a route the same way over and over without considering weather and snow pack conditions.
- Avalanche Control route review- every four to five years. This is something that we have done several times over the years. Get all your route leaders together on a route that they all know and go over the route with a fine-toothed comb. This method has changed the way some of our avalanche control routes are conducted making them safer and more efficient.

*What are some of the things that have changed?
What are some of the problems that occur with change?*

- (1) Gear- Randonee/skins
The way we approach a route has changed over the years with new types of travel gear. We used to wallow through waist deep snow or snowshoe. Now with randonee gear and skins we tend to traverse further into uncontrolled slopes.
- (2) Pressure- Let the weather and snow pack conditions dictate your route. Trying to open an area too quickly has caused serious accidents. Management should understand this and allow plenty of time for appropriate control.
- (3) Most accidents or close calls happen near the end of the route. Many are thinking about getting a run or two in before returning to work and may consider the avalanche potential as minimal. At this time partners tend to separate and a lack of concern for your surroundings may leave you in an unsuspected pocket.
- (4) Complacency- doing the same routes the same way because that was the way they were taught. I have seen lots of close calls and accidents in this situation. Everyday conditions are going to be a little different.
- (5) The right charge and forecasting avalanche potential. This is a tough one. In some situations such as in a ski area, you may not necessarily want the snow to

slide. Finding the right equation between instability and acceptable risk in opening an area to the public can be tricky.

- (6) Technology advancing too fast without adequate testing. There is new detonation technology on the horizon. Remember that we have been using cap and fuse since the early 1950's- with good product this detonation system has proven itself over time. Make sure that when trying new methods you are prepared and the necessary testing with time and conditions has been done. Never change or alter a part of your program that has worked well for you for a long time until you have enough information to back it up.
- (7) Security- A lot has changed over recent years in the way we manage our explosives programs. Some of the changes that come from State or Federal rules really need to be reviewed by the user to make sure it will make things safer and more secure. Group together in your states and voice your opinions as a group on rules and laws.

Your training and avalanche control program should include-

- (1) Written Procedures
 - (a) Federal
 - (b) State
 - (c) Local operation and procedures plan
- (2) Training-taking care of your new people and seasoned veterans
 - (a) Written
 - (b) Application
 - (c) Documentation
- (3) Plan Application
 - (a) Communication
 - (1) Make sure all information is available to avalanche control personnel
 - (2) Morning Briefing
 - (b) Continual monitoring of weather, snow pack and documentation
 - (1) Morning safety and afternoon weather observations.
 - (2) Snow profiles and review of current and historical weather and avalanche records.
 - (3) Constant review of case histories, program and data compiling.

- (4) Weather and Snow Pack information board
 - (a) Avalanche control and mitigation. Keeping things as simple as possible.
 - (1) Explosives handling procedures
 - (2) Hand control (insert) route safety plan
 - (3) Artillery. (insert) gunner safety plan
 - (4) MSDS
 - (b) Documentation
 - (1) Shot Records
 - (2) Avalanche occurrences
 - (3) Weather and snow pack

CONCLUSION

Constantly evaluate your explosives and avalanche control program and let others do it- this is important, it is too easy to become set in the old ways. Bring a new set of eyeballs from time to time.

If you see something in the way explosives are being handled or in the way a route is done that you are uncomfortable with- **let it be known.**

Be willing to face facts. Montgomery Atwater, in his book *The Avalanche Hunters*, refers to a lot of people in the U.S. as unwilling to face facts about being in avalanche terrain. Whether it is working at a ski area, building a house in avalanche terrain or working in a highway or backcountry operation, some people are still unwilling to admit that they are involved in avalanche country- especially if it involves money.

Training and guiding- Give your crew all the information they need to make good decisions and follow through. Keep seasoned veterans engaged by giving them the responsibility of mentoring the new people. Good mentors teach people to develop sound judgment.

WARNING!!! Beware of advancement in technology moving too fast without adequate testing.

After 20+ years of working in the avalanche control industry I started to think that I may be somewhat burned out, like I was near the end of my career. In August 2006 I re-read Monty Atwater's book, *The Avalanche Hunters*. Reading this book got me all fired up again. Imagine being the one on the forefront of snow science, avalanche control and the onset of snow recreationalists in the mid-1940's getting paid to figure out how to minimize the avalanche hazard to the public and figuring out avalanche rescue without the support we have today.

I realized that this job of avalanche control is a never-ending learning experience and after 60 years of avalanche control in the U.S. we are all still on the forefront of snow science, avalanche control, minimizing risk to the public and improving avalanche rescue. Although, we have added electronics and some fancy terminology.

We as a community have done a lot of good research and development. This has helped to refine the techniques that Atwater introduced and improved forecasting, snow science, avalanche control and avalanche rescue. I recommend reading or re-reading the *Avalanche Hunters* and reviewing the basics.

So in the past part of avalanche control we have seen the development of the procedures and techniques of hand charges, ski cutting and artillery that we still use today.

In the present part of avalanche control we have learned more about the snow pack, devised more stable explosives, developed better delivery systems and improved avalanche and weather forecasting.

In the future of avalanche control? I think in another 20 years we will be doing hand routes, ski cutting and using artillery, maybe by way of satellite.

The more you know about the products and procedures you use, the better decisions you can make about how to use them safely.