

DIGGING DEEPER:
UNCOVERING THE REAL ISSUES IN NORTH AMERICAN MULTIPLE BURIALS.
Part Two – Real Experiences from the Field.

By Bruce Edgerly

INTRODUCTION

People are people. They are not numbers. To find out what the real issues are in avalanche rescues, we must go beyond statistics and speak directly to the select group of people who have actually had an avalanche transceiver in their hands during real, live avalanche rescues. This is what we have done in part two of our ongoing research on multiple burials. Our findings: in real multiple burial situations, it's not about beacon searching; it's about shoveling. This is what avalanche educators should be teaching in their courses, along with organization, basic beacon searching, probing, avalanche escape strategies and airbag use.

Part one of our research included statistical studies in North America and Tyrol, Austria by Bruce Edgerly and Dieter Stopper, respectively, who shared the services of consulting computer scientist, Jon Mullen. Both of these studies were published last season in *The Avalanche Review*, independently concluding that "special case" close-proximity multiple burials are extremely rare—and often overstated by beacon manufacturers. Since then, several other reports have been published, including a study by French avalanche researcher Frédéric Jarry. He cites Swiss researcher Manuel Genswein's suggestion that at least two shovelers are recommended per buried victim for that person to stand a chance at survival. But according to Jarry, very few recreational groups have that kind of manpower. In the absence of shoveling manpower, he argues, then advanced techniques (and technology) for complicated multiple burials are a distraction from the real issue: shoveling. Sooner or later, Jarry concludes, it's necessary to start digging!

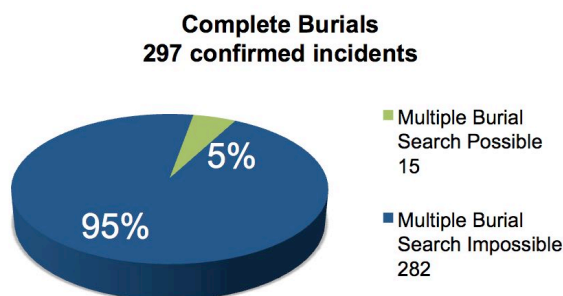
No matter where the statistics come from--researchers or beacon manufacturers, North America or Europe--they're still only statistics. They are not capable of telling the real story. An avalanche debris pile is not the place for creative statistics and "ivory tower" thinking. It is a place for grim reality. Every avalanche incident is as unique as the people involved. This is why in part two of our research we have chosen to "dig deeper" and speak to those individuals who have actually performed a multiple-victim transceiver search in the field.



For the victim to have a reasonable chance of survival, there should be at least two shovelers for each buried victim. Most recreational groups don't have that kind of manpower, according to Jarry. (Photo by Bruce Edgerly.)

STATISTICAL REVIEW

According to the American Avalanche Association incidents database (www.avalanche.org), from 1995 through April 2008, just 14 percent (45 incidents) of roughly 300 complete burial incidents involved multiple victims. Of these 297 confirmed complete burial incidents, just 5 percent (15 incidents) involved multiple-victim beacon searches.



Of these same 297 incidents, just 1.7 percent (5 incidents) involved close-proximity multiple burials, where a special technique (or technology) could have been applied. Normally, a multiple burial can be solved with common sense, by searching for the victims "in series" or "in parallel," using the same techniques that are used in single burials. Only in "special case" multiple burials would a special technique or technology come into play.

These involve cases where two or more completely buried victims are within roughly 10 meters of each other (close enough so their signals are hard to differentiate)—and where there is adequate manpower so some rescuers can start digging while the best searcher continues with the beacon search.

These low percentages are a significant departure from a 2002 Swiss study which asserted that 60 percent of avalanche victims were involved in multiple burials. They also strongly contradict a recent printed statement from a German beacon manufacturer that "about 50 percent of all reported avalanche accidents involve two or more persons with interfering signals."



In most cases, the technique for a multiple-victim transceiver search is the same technique that is used for a single victim search. By moving systematically through the debris, a digital transceiver will isolate each signal as the searcher gets closer. Only in special cases involving close-proximity burials—and adequate manpower—should this technique change. (Photo by Simon Fryer.)

DIGGING DEEPER: RESCUER INTERVIEWS

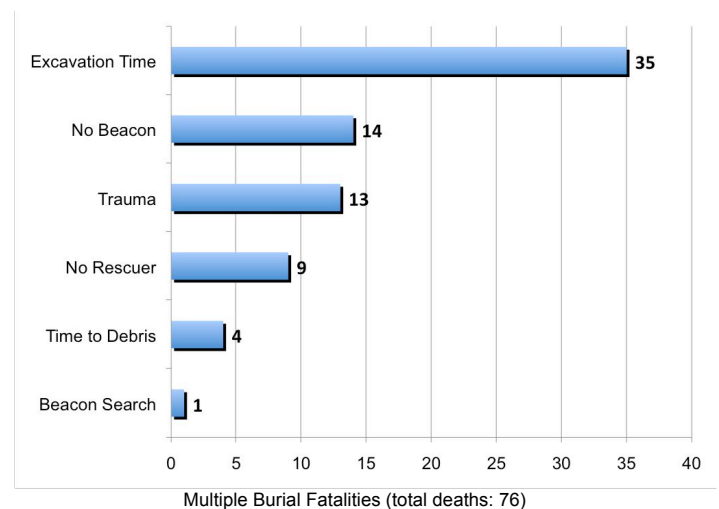
We began "digging deeper" by contacting members of the 15 parties in which multiple-victim beacon searches were actually performed. In addition, we contacted members of parties in which at least two people were reported killed from 1995 to 2008 on www.avalanche.org. The objective was to make sure these were captured in our research and to get "worst case" feedback from the field. This added up to roughly 35 incidents that we investigated through

interviews with actual rescuers, coroners, search-and-rescue teams, and/or other witnesses.

To get a big-picture view of the entire rescue process, we asked the following questions to each person that we contacted:

- How many victims were completely buried with no surface clues?
- How deep were they buried?
- How far apart were they buried?
- Did you perform signal triage to prioritize those victims most likely to survive?
- Did the victim(s) die from asphyxia, trauma, or some other means?
- Was there a last-seen-area?
- Did you perform a primary/signal search?
- Was there any confusion from interfering beacon signals?
- What beacon search techniques were used:
searching in series, searching in parallel, micro search strips, the Three-Circle Method, Special mode, "marking?"
- Did you turn off the victim's beacon after pinpointing him/her?
- What technique was used for excavating the victims?
- How much time was spent searching versus shoveling?
- What was the most time-consuming part of the rescue?

In conjunction with these lengthy—and often emotional—conversations, we defined the primary cause of each fatality in each multiple burial incident, with the help of the witnesses and/or respective coroner. These results are summarized in the bar graph below:



In 76 multiple-burial fatalities, *excavation time* was cited 35 times as the primary issue. This was followed by *no beacon* (14) and *trauma* (13), respectively. There was only one case in which a confusing beacon search was cited as a problem. And in this case, the rescuer said it was mainly the depth of burial, not multiple signals, that caused the confusion.

ADDITIONAL FINDINGS

- Close-proximity multiple burials were extremely rare. They included the case above from Kokanee Glacier, B.C. in 2003; the well-publicized incidents at Durrand Glacier and Connaught Creek, B.C., also in 2003; a highmarking incident near Fernie, B.C. several years ago and another snowmobiling incident near Afton, Wyoming in January 2008 (in this case, there were no survivors to perform a companion rescue). Confusing signals were cited as a problem only in the incident at Kokanee Glacier.

- Burial depth and lack of shoveling manpower are the main contributors to excessive excavation time. Non-releasable bindings can increase the depth of burial and also hinder the rescuer's ability to extricate and treat the victim. In at least one case, an avalanche airbag was used and was effective in preventing burial depth.

- While rare, multiple burials are best avoided, as they almost always result in fatalities. In only 1 of 45 multiple-burial cases did all the completely buried victims survive. In this 2004 incident, numerous rescuers were available to excavate the two victims, who were highmarking in a popular snowmobiling area near Lake Ann, Washington. The best options for maintaining shoveling manpower are appropriate group size, proper terrain selection, skilled routefinding, and exposing as few people as possible to the avalanche hazard.

It's possible that other successful live recoveries have occurred. The database at www.avalanche.org is mainly limited to fatalities; live recoveries often go unreported.

- In several cases (including Lake Ann), rescuers said they had a problem with errant signals coming from other rescuers. While it can be extremely helpful to have multiple searchers on the scene, this can complicate the beacon search if there is a lack of site control.

- Of all the complete burial incidents, just over half of the victims were wearing beacons. This was higher in Canada (79 percent) than in the U.S. (43 percent). This difference is partially explained by the prevalence of commercial guiding in Canada compared to the U.S. Canadian guided groups comprised a relatively high percentage of the multiple burial incidents. In commercial groups, all participants are required to use transceivers.

- Transceiver use is on the rise. From the periods 1998-2002 to 2003-2008, beacon use rose from 52 percent to 57 percent of the victims.

- Snowmobile avalanche incidents comprise roughly 40 percent of overall avalanche incidents. This percentage did not change significantly from 1998-2002 to 2003-2008.

- Transceivers are slightly less accepted by snowmobilers than by non-motorized users. Just 44 percent of the snowmobiling victims were wearing beacons, while 55 percent of the non-motorized victims were wearing them.

- The concept of a "primary search" was irrelevant. In almost all cases, there was a last-seen-area or the rescuers had a clear idea of where to begin the beacon search. In four cases, excessive time was spent traveling before a signal was acquired. This was attributed to difficult footing or an effort to avoid secondary avalanche hazards ("hangfire"), not to the lack of a signal.

- Keep your gloves on! In several cases, the excavation process was compromised by non-functional hands after the rescuer took off his or her gloves to assemble gear, then lost them.

CONCLUSION

To understand the real issues in multiple burials, statistics are just a starting point. By interviewing the rescuers who have actually performed multiple-victim beacon searches on the snow, we see a clearer picture of what matters: excavation time and carrying beacons. For avalanche educators that are teaching courses to recreationists, time is limited. To best serve their students, educators should emphasize the following:

1. Organizing the rescue: Allocating manpower, controlling the site, and calling for assistance when appropriate.

2. Basic beacon searching: Owning beacons, mastering single burials, and--in more advanced groups--double burials performed in series or in parallel. Instruction on "special case" close-proximity techniques should be limited to professional courses.

3. Shoveling techniques: Several recently published reports propose valuable techniques for efficiently excavating avalanche victims, including "strategic shoveling" and the "V-shaped conveyor" method (see References, below.)

4. Probing: Basic probing for life-sized targets, not Tupperware, using a spiral or concentric circle pattern.

5. Reducing the depth of burial: This can be accomplished through proactive escape strategies, releasable bindings, and avalanche airbag technology.

Most important, however, is preventing avalanche incidents in the first place—through on-snow education, terrain selection, proper routefinding, and effective communication. Ideally, educators shouldn't need to teach avalanche rescue in their courses at all. But this, of course, is more "ivory tower" thinking—and there's no place for that on the debris pile!



Grim reality. On the avalanche debris pile, it's about shoveling, not beacon searching. (Photo courtesy Flathead County Coroner).

APPENDIX: QUOTES FROM THE FIELD

"Everybody was located in a surprisingly short period of time. But the snow was like concrete compared to the Cool Whip we dig through when we practice beacon searches."
Durrand Glacier, BC, January 2003

"The search was not difficult. The hardest part was controlling the group, keeping my eye on everybody."
Durrand Glacier, BC, January 2003

"If somebody has the basics with their transceiver, they do a pretty good job of it. People usually have the most problems with probing and shoveling--and organizing. It's become obvious to me we need to focus on the skills that take most of the time."
Connaught Creek, BC, January 2003

"Excavation took much, much longer than searching--by a factor of about ten. The pit was so deep that it was hard to clear the snow out of it and there wasn't much room to work."
Mt. Tom, CA, March 2005

"It was easy to locate them. It was really hard to dig them out—and to actually do something to them."
Mt. Carlyle, BC, January 2002

"We were confused by the depth, not the multiple signals. I never practiced with a beacon three meters deep."
Kokanee Glacier, BC, January 2003

"All said and done, the actual locating was fairly easy. The hardest part was getting down to where we thought they were in the debris pile--and seeing your friends dead."
Tonar Bowl, CO, March 2000

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