

Advanced Education for Snowmobilers in Alaska

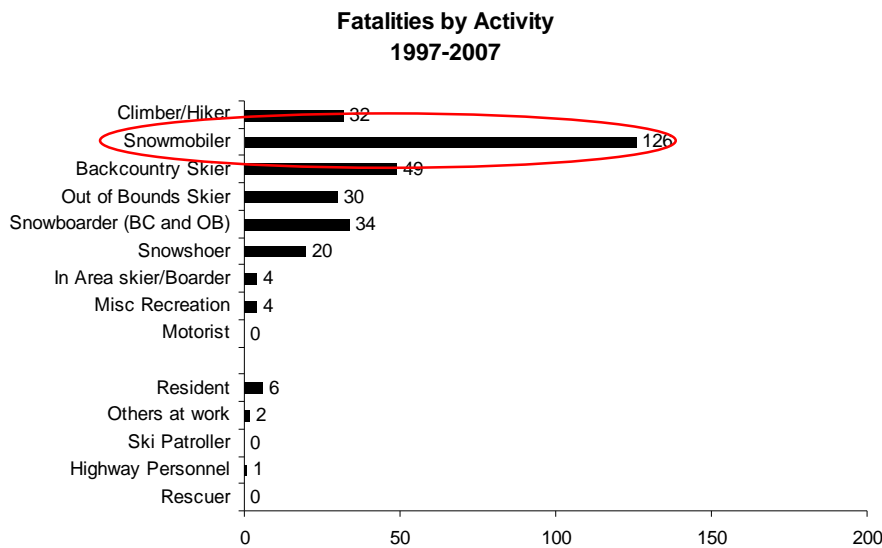
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Alaska Avalanche Information Center



Witness the birth of a new era of avalanche education. The Alaska Avalanche Information Center hosted and instructed America's first nationally recognized American Institute for Avalanche Research and Education (AIARE) Level I avalanche course, specifically designed for backcountry snowmobilers. The course was held February 05 - 07 in Valdez, Alaska, with the field components taught in the spectacular setting of Thompson Pass and the Tsaina Glacier Valley.

Snowmobilers in Alaska continually lead the statistics for avalanche fatalities in the United States. As this disturbing trend only gets worse, the concept for snowmobile-specific education is born: provide specialized courses taught by experienced, progressive snowmobilers. In the past, snowmobilers who took the initiative to enroll in an avalanche class higher than the awareness level stuck out like a sore thumb. They often became a logistical conundrum in the field and were sometimes alienated by the skier-oriented snow, terrain, and travel assessment/technique. They were asked to strap on a pair of skis or snowshoes (obviously not their first choice of travel tools), then required to chase the class around the hills, making timing and delivery of instruction often challenging for instructor and student alike. Instructors on skis approach the terrain quietly, slowly, and cover a limited amount of ground each day. This is maybe the first and last time that the student will don a pair of snowshoes/skis in their life, or hear subtle changes in snow conditions while walking quietly through the mountains. The statistical trends in the United States have shown us quite clearly that this approach has not been effective. An educational paradigm shift was clearly needed.



Graph provided by AIARE

The Level I curriculum currently taught is great for skiers, snowboarders, cross country skiers and snowshoers. It is the foundation of their avalanche education and has become the standard for recreational backcountry skiers for at least the past fifteen years. After receiving criticism from snowmobilers yearning for higher education The Alaska Avalanche Information Center developed a curriculum to address the issues of terrain selection, travel techniques, slope stability testing, group dynamics and observational guidelines which are specific to backcountry users traveling on snowmobiles. This thirty hour course was taught on snowmobiles by active snowmobilers, who could speak the language of the user group. This course was very well received by participants.

In addition to the AIARE Level One guidelines, material and techniques specific to backcountry snowmobile travel were added to the core curriculum. The classroom components that were covered consisted of:

1. An Introduction to AIARE and the Alaska Avalanche Information Center's mission
2. The goals and objectives of Level One avalanche education
3. The "anatomy of a decision" and the AIARE decision making framework
4. A detailed analysis of case studies pertaining to snowmobile triggered avalanche fatalities in Alaska and the United States, with specific emphasis on a human

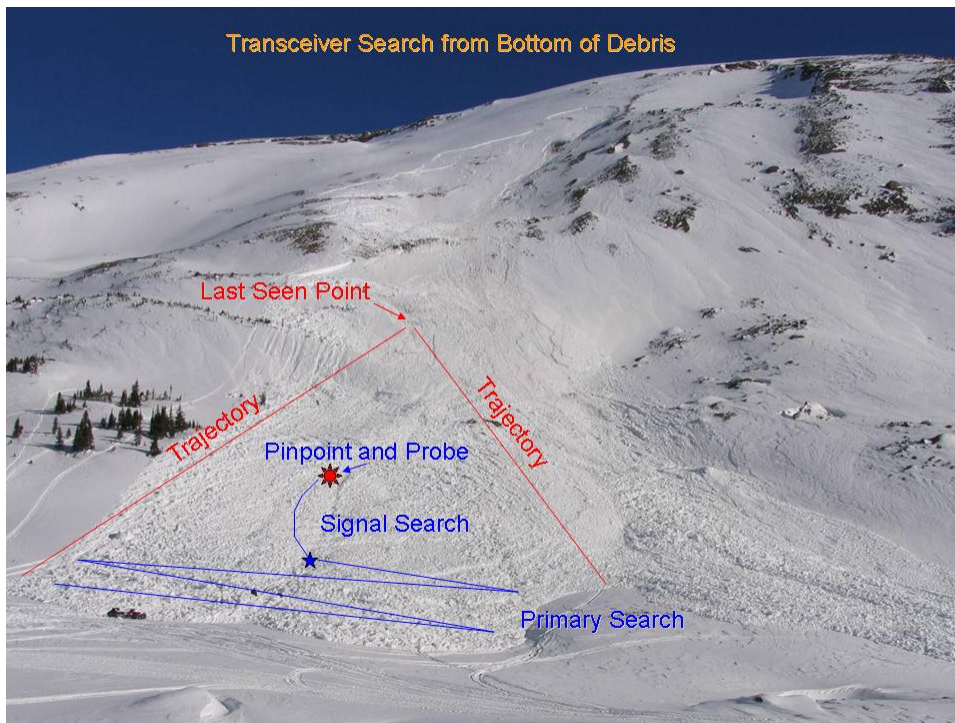
- triggered avalanche fatality in April of 2009 in Thompson Pass near Valdez
5. The basics of avalanche types and characteristics
 6. Avalanche terrain recognition
 7. The formation of layers in the mountain snow pack and snow crystal metamorphism
 8. A review of the North American Danger Scale and how it relates to avalanche bulletins and forecasts
 9. Observing obvious clues and specific observational techniques that can be used while riding a snowmobile
 10. Tabletop exercises using the AIARE observation checklist
 11. Snowmobile trip planning and preparation
 12. A thorough review of human factors and heuristic traps
 13. Terrain selection and travel techniques specific to snowmobiling
 14. Snow pack stability tests both in the pit and on the go
 15. Snowmobiler companion rescue techniques

The main focus of the course was selection of terrain appropriate for conditions. The participants conducted several table-top route finding scenarios and trip planning exercises before heading out to the field. Considerable time was spent reviewing the avalanche size table, reporting guidelines, and the language used by avalanche professionals. Because snowmobilers have the capability to cover tremendous amounts of terrain in a single outing, they have become one of our greatest assets in developing public avalanche bulletins. We all gain when snowmobilers make and communicate quality observations. The course field sessions focused on decision making in avalanche terrain: communication techniques while on a snowmobile, several route finding exercises involving simple and challenging avalanche terrain features, weather observations, recent avalanche observations, snow stability tests both on and off the machine, and several complex companion rescue exercises.

The main difference between a skier specific Level I program and the snowmobile specific curriculum is the amount of terrain that can be covered in a single outing. Thirty minute route finding exercises took place on slopes that could be the entire venue for a ski course day. The all-day field component on the third day of the course consisted of a snowmobile ride that covered the three distinct snow climate zones. In a single day,

participants observed the maritime snowpack, traversed the inter-mountain region, and finished in a continental snowpack. This is typical of an outing for snowmobilers who often cover well over a hundred miles per day in this region of Alaska and exemplifies another major difference in course curriculum from a skier specific course.

Another significant difference in the curriculum is in companion rescue techniques. Instead of starting from the last seen point and traveling downhill, most snowmobilers will be approaching the debris from the bottom to perform an initial search. The majority of snowmobile related avalanche accidents involve a person climbing a hill and triggering a slide while their companions wait at the bottom. This is significantly different from the current search techniques developed by skiers involving only top-down search pattern. Skiers should learn these techniques as well, as anyone skiing a slope one at a time should be prepared for those at the bottom to effect a rescue. Since there are currently no graphics available to visually demonstrate this technique, we were forced to create our own. We recommend: groups avoid congregating in runout zones, have their machines positioned for hasty retreat and not assist those stuck in avalanche start zones. The victim's companions are taught to spot the last seen point of the caught rider, calculate the downward trajectory and begin their primary search pattern from the toe of the debris directly below the last seen point.



Participants were also taught subtle differences with regard to companion rescue and “what to do if you are caught in an avalanche”. For example, the snowmobiler will, more often than not, be traveling uphill when the avalanche occurs. If the rider is carrying some speed in an uphill trajectory when the slab fails, they should make every attempt to ride off of the top of the moving slab. If, however, they have already made the turn, and are traveling back down the slope when the slab fails, they should proceed similarly to a skier and attempt to ride off of the slab at a 45 degree angle to the side. If they are at the bottom of the slope when the slide occurs, and have their machine pointed in the correct direction, attempts may be made to outrun the avalanche. Instructors need to remember that their students will be working with motorized equipment, and the additional 150 horsepower can sometimes be helpful when an avalanche occurs. Snowmobiling is both an uphill and a downhill activity.



Companion Rescue Training, Photo: Michel Freiderich

Snowmobile slope stability testing differs greatly from techniques used by skiers or snowboarders. Although compression tests, hand shears, and extended column tests were demonstrated to the students in the pit, our main focus was on the representative

slope stability testing that can be done while riding a snowmobile. These tests need to be demonstrated to the group on small, lower consequence slopes, and must be performed by competent snowmobile riders to be effective. Although these tests are not yet quantifiable, they are extremely effective at finding and identifying weak layers within the snowpack.



Crevasse rescue equipment is worn by all participants traveling on glaciers, Photo: Michel Freiderich

The following seven slope stability tests for snowmobilers are skills which should be demonstrated by a proficient instructor and thoroughly explained to insure complete student understanding of the technique and the result analysis. These tests must be performed on slopes that are small enough so that burial of the rider is not possible. The slope angle should be in the 30 to 40 degree range to provide quality results.

The following tests are expanded below:

1. Looping Slope Test
2. Downhill Traverse Test
3. Rollover Ride-Out Test
4. Rip Saw Cut Test

5. Parallel Rip Saw Cut Test
6. Impact Test
7. Rollover Rip Saw Cut Test



Mike Buck Demonstrates the Rip Saw technique, Photo: Michel Freiderich

The “rip saw” technique is used for several tests. It is the process of leaning the snowmobile into the slope and counter-steering with the downhill ski in the air causing the track to cut deep into the slope. Riders should have this skill mastered to obtain quality results.

The Looping Slope Test is the most basic test used in backcountry snowmobile travel for stability evaluation purposes. This test is performed by looping up, across, and down a slope in a half moon crescent to attempt to trigger a slope release. This basic test, when successful in triggering a release, indicates significant snowpack instability.

The Downhill Traverse Test starts from the top of the slope riding at a 30 to 45 degree angle across the slope face with some speed. The rider must not carve into the surface when performing this test. Slab release while performing this test will identify weak layers, sensitivity, and slab property.

The Rollover Ride-Out Test starts from the top of the slope riding straight down at a slow speed intermittently braking during the decent. This test is performed when stability is suspected to be poor to fair. Horizontal slab propagation from the machine indicates both weak layer and slab properties. Pushing powder snow in front of the machine means little; this is not an indicator of instability.

The Rip Saw Cut Test traverses the uphill track starting from the bottom and angles across the slope at a 30 to 45 degree angle. It is imperative to maintain track speed and counter-steering during this test, leaving a trench across the slope face. This test will provide data on deeper instabilities and weak layers in the snow pack by putting significantly more stress on the slope.

The Parallel Rip Saw Cut Test is performed from the bottom. The tester rides up the slope, then turns ninety degrees and rides across the slope parallel to the bottom. Multiple cuts are made parallel to one other, four to ten feet apart starting low, with each subsequent cut made above the previous. Data is obtained from cutting above unsupported snow. If poor stability is suspected the test should be reversed, cutting the slope from top to bottom. Both methods should be performed if any result is observed. Inspection of the results is required to assess the stability of the snowpack.

The Impact Test is performed from the top down. The tester should carry enough speed to make a small jump from the top of the hill onto the slope below. This test is best performed on a slope with a flat top and a convex rollover. A small cornice will often assist the tester. It is important to learn this technique from an experienced rider due to the potential of a back injury if not performed correctly.

The Rollover Rip Saw Test is performed from the top of the slope. A convex rollover is the best type of slope for this test. The tester begins the approach parallel to the horizontal convexity, drops just over the edge with a rip saw cut along the apex of the rollover, and completes the test back on top of the test slope. This is an effective test to determine the stress in the snow pack at potential trigger points, similar to ski cutting convex rolls.



Mike Buck demonstrates slope testing with a snowmobile, Photo: Michel Freiderich

Participants were taught to examine the properties of any released slabs. The fracture, the slab, the weak layer, and the bed surface are the clues the riders use to make subsequent decisions on terrain and route selection for the day.

The keys to the success of the AIARE Snowmobile Specific Level I are the instructors and the terrain selected for the field components. It is easier to teach snowmobile riders to be avalanche instructors than it is to teach avalanche instructors to be good snowmobile riders. Snowmobile riders need to be cultivated early and provided with the tools and education to be avalanche instructors. It is just as ineffective to teach an avalanche class to a snowmobiler traveling on snowshoes as having an instructor who cannot ride the snowmobile proficiently and demonstrate slope stability testing techniques or terrain selection options well. To maintain our credibility with this user group, instructors for these courses must have extensive riding abilities and experience. We believe that minimum experience standards will need to be created for snowmobile instructors, similar to the standards that have been set for skier specific courses presently being taught.



Tools of the trade, Photo: Michel Freiderich

The Alaska Avalanche Information Center is focusing our efforts on snowmobile safety in an attempt to break the disturbing trend of snowmobile related avalanche fatalities. To counter the argument that snowmobile riders are “not ready” for Level I avalanche education in favor of “advanced awareness” level courses, we submit that the industry as a whole should strive to educate all outdoor enthusiasts, and to provide quality education especially to those in the highest fatality category.

Contact the Alaska Avalanche Information Center at alaskasnow.org@gmail.com or www.alaskasnow.org for more for more information.



The field sessions are the key to the success of any avalanche course, Photo: Michel Freiderich



Safety briefing and pre-trip communication, Photo: Michel Freiderich