AVALANCHE ACCIDENT- Boardman Pass
SUBMITTED BY: Sawtooth National Forest Avalanche Center
LOCATION: 15 Miles northwest of Fairfield, ID
DATE: January 28, 2010
SUMMARY: 1 snowmobiler caught, buried and killed

SYNOPSIS:
On January 28, 2010, a group of five backcountry snowmobilers were riding near Boardman Pass in the Soldier Mountains of southern Idaho. This area is approximately 15 miles northwest of Fairfield, Idaho and is often accessed from the popular Chimney Creek trailhead. Two riders were climbing the west side of Pt. 9538 when a slide started above the uppermost rider. A third rider watched as moving snow overtook the first rider and the second rider turned to the climber's left and out of the slide. The slide carried the victim over a thousand vertical feet downhill and buried him four to five feet deep next to his snowmachine; the debris continued several hundred vertical feet further downhill. The party quickly regrouped, located the burial site with a beacon and dug deep enough to provide an airway within an estimated 25 minutes. CPR was unsuccessful. The SS-AMu-D3-R2 avalanche was 2 to 3 feet deep, approximately 300ft wide and ran over 1300 vertical feet. Prior to the accident, the Soldier Mountains had received over 3" of Snow Water Equivalent and roughly three feet of snow since January 12. Moderate to strong southerly and westerly winds had accompanied the snowfall, with wind speeds peaking five days before the accident. The mid-January snowfall fell on an unusually weak layer that had been a concern the entire season. A widespread natural avalanche cycle had occurred in much of the advisory area the weekend prior to the accident, and a smaller avalanche had claimed the life of a skier a week earlier; the local and regional press had covered that accident extensively. On the morning of January 28th, the Sawtooth National Forest Avalanche Center (SNFAC) had identified the avalanche danger as Considerable because of the recent loading on the persistent early season weak layer. That day's advisory urged extra caution on steep rocky slopes due to the persistent weak layer buried at the base of the snowpack, recommended that people avoid travel on slopes steeper than 30 degrees, and expressed concern about the sunny, warm conditions forecast for the day.

The coordinates for the accident:
N 43° 29'43"
W 114° 58'01"

AVALANCHE:
The avalanche occurred roughly 200 vertical feet below Pt. 9497T on the broad, south shoulder of Pt. 9538T. The slab broke out at the top of an open, slightly concave slope below sparse trees and snags; a distinct trimline on the looker's right marks this slope as an obvious avalanche path. It was classified as a SS-AMu-D3-R2. It released on a west-northwest facing slope and the relatively uniform crown was an estimated 2 to 3 feet deep. The slide propagated horizontally across the slope, and from photos appeared to be about 300 feet wide. The looker's right side of the slab broke out in a ribbon of sparse trees that extended from the trimline below towards the ridgeline above. The slope was estimated to be between 35 and 40 degrees. The debris was estimated to be at least 10 feet deep in the vicinity of the burial site. These observations were made from the air and from photos and video taken by Sun Valley Heli-Ski, who performed an aerial survey of the site the following day.

WEATHER & SNOWPACK:
Weather data is taken from the Soldier Mountain Peak 2 weather station operated by Soldier Mtn Ski Area and the SNFAC, as well as the Dollarhide and Soldier Ranger Station SNOTEL stations. The first is located 3.25 miles to the east at 9450 feet and was operational for the season on January 12. The Dollarhide SNOTEL is roughly 17 miles east-northeast at 8420 feet elevation. The Soldier Ranger Station

SNOTEL sits at 5740 feet elevation near the base of the Soldier Mountain Ski Area, roughly seven miles east of the accident site.

At the time of the accident, the snowpack in the Soldier Mountains, like that in much of the Intermountain West, was marked by an unusually weak layer of faceted snow and depth hoar buried near the ground. This layer consisted of snow that fell during the late fall, but was then exposed to strong temperature gradients during a 19-day dry spell that lasted until December 11th. Over the next week, a series of storms deposited 1.4" of SWE on top of the facets and depth hoar layer. The shallow, unconsolidated snowpack made travel in the mountains very difficult both on foot and by snowmachine, and few parties reported making it into backcountry areas in the Soldier Mountains during this period.

A three-day storm over New Years added up to 20" of new snow and 1.4" of snow to the snowpack. On January 2, a widespread natural avalanche cycle was reported at all elevations in the Soldier Creek area and near Boardman Pass in the Rough Creek drainage. These slides ran on the weak basal facets and included numerous small slides on roadcuts as well as slides up to 3 feet deep at mid-elevations. A small storm on Jan. 4-5 dropped only 0.3" of SWE but was accompanied by strong northwesterly winds. A widespread natural avalanche cycle was reported at mid- and upper-elevations in the vicinity of Paradise and Baker Peaks, roughly 20 miles north-northeast of Boardman Pass. These slides also ran on the weak basal facets and depth hoar. On Jan. 9th, the crew installing the Soldier Mtn Peak 2 weather station reported remotely triggering a medium-sized slide on an upper elevation, east-facing slope three miles from Boardman Pass.

By January 12th, the weak facets and depth hoar at the base of the snowpack had been buried by about 4" of SWE at mid- and upper elevations. This snowfall had consolidated into a slab about 18" thick. The series of avalanche cycles over the first two weeks in January demonstrated that the weak layer was sensitive to even small amounts of loading and nominally small changes in weather conditions. Through this period, the SNFAC estimated the avalanche danger as Considerable on most shaded (west – north-east) mid- and upper-elevation slopes.

From January 12th through 26th, four storms deposited an additional 3" or more of SWE on top of the already weak snow structure. The bulk of the snowfall occurred during the middle of the two-week period and was accompanied by southerly winds that averaged in the mid teens and gusted to 50 mph at the Soldier Mountain weather station. Ridgeline winds veered to the north-northwest on Jan. 23rd and 24th and gusted to over 70 mph before backing to the southwest and diminishing on the 25th. Temperatures gradually decreased during these two weeks. Daytime highs at upper elevations dropped from freezing on Jan. 12 to 20 degrees on Jan. 19th, with only a slight increase over the next few days. Overnight lows were in the teens.

An observer for the SNFAC reported unstable conditions on wind-loaded slopes at mid-elevations in Soldier Creek on the 23rd, as well as very difficult travel conditions. Despite the difficult riding, a party of snowmachiners was able to reach Boardman Pass on Sunday, Jan. 24th and observed or triggered a large slide (D3-R4) on a steep, northerly slope about a quarter mile north of the slope where the accident would occur four days later. Elsewhere in the advisory area, the wind and snowfall led to a remarkably widespread natural avalanche cycle on Jan. 22nd and 23rd. Most of these slides occurred on shaded slopes and were from 1 to 3 feet deep.

Monday, January 25th marked the start of a change in the weather patterns and temperature regime in the Soldier Mountains. The snowfall tapered off, the wind backed to the southwest, and clearing skies allowed that day's high to reach freezing at upper elevations. The Dollarhide SNOTEL showed that the snowpack at the station settled from 60" to 53" between Jan. 23rd to 27th. On the morning of Jan. 28th, the day of the accident, the Soldier Mountain Weather station at 9450 feet showed a low of 14 degrees, the third coolest since the mid-January storms began. With only a few clouds in the sky, temperatures climbed quickly and by mid-morning were approaching freezing. Winds were light and southeasterly. Temperatures were above freezing by early afternoon and the station recorded a high of 39 degrees between 2:00 and 3:00 P.M.

Two forecasters from the SNFAC were riding in the Soldier Creek area on the day of the accident along with an observer from the local Forest Service office. The observer noted several times that the snowpack was much more supportable and riding conditions had improved dramatically since the weekend. The SNFAC personnel dug snowpits and conducted stability tests on several northerly facing slopes. They saw three other parties riding in the vicinity, including one party of eight that repeatedly highmarked a very steep, northeasterly slope without incident, despite multiple riders on the slope at the same time.

One pit was located less than three air miles east-northeast of the accident site and two air miles northwest of the Soldier Mountain weather station. It was dug on a north-northwest facing, 21 degree slope at about 9000 feet elevation. In this pit, the snowpack was over five feet deep and showed the same basic structure observed on most slopes in the advisory area throughout the season – a homogenous slab overlying the persistent early season weakness. The slab was over three feet thick and its hardness increased from 4 fingers at the top to pencil at the bottom, and showed no intermediate weaknesses. The persistent weak layer was comprised of 12" of faceted grains and depth hoar, with the softest (fist hard), coarsest-grained snow making up the bottom portion of that layer. A knife-hard crust lay between the weak layer and the ground. A propagation saw test (PST) and a deep Extended Column Test (ECT; conducted by removing all but 22 inches of the slab above the weak layer) both indicated that the snowpack retained the energy and structure needed to propagate failures. The PST scored 52/127 end, while the deep ECT scored ECTP 18 Q2, both on the softest part of the basal weak layer. The test results and observations of other riders confirmed that the area was facing a deep slab instability problem, in which the places from where it was possible to trigger a failure in the snowpack were growing isolated, but once initiated, failures would propagate into large, catastrophic slides.

EVENTS LEADING UP TO THE ACCIDENT:

A group of five local snowmobilers was spending the day riding in the Soldier Mountains, terrain with which they were familiar. At least one of the survivors had checked the avalanche advisory that morning. Four of the five were equipped with beacons, shovels and probes. From the Chimney Creek trailhead they rode northeast into Rough Creek, then crossed over the ridge and through the head of South Fork of Lime Creek before approaching Boardman Pass from the north. At the pass they talked with a party of two other riders; these were the same riders who'd reached Boardman Pass and observed or triggered a large slide on Sunday, Jan. 24th. The two parties discussed that avalanche, the crown of which was clearly visible from the pass on Thursday, Jan. 28th. The victim's party also discussed the unstable snow conditions, decided it was time go, and considered several options for returning to the trailhead, including retracing their route. They decided to ride down Lime Creek on the south side of the pass and left the pass at about 2:45 P.M.

The victim's party began playing on their way out, and about a mile below the pass one rider started to climb the steep west side of Pt. 9497. He stopped on an elevated area about midway up the slope, on the climber's left side of an avalanche path. The victim and a third rider began riding up the slope, with the victim several hundred feet ahead and eventually sidehilling to the right towards the center of the bowl.

The first rider watched the avalanche start about 30 to 40 yards above the victim as he reached the center of the bowl. The second rider saw the fracture and turned to his left and away from the slide. The slide swept the victim over a thousand vertical feet downhill and buried him in a gully; the debris continued several hundred vertical feet further downhill. The survivors estimate that the slide occurred at 3:15 P.M.

SEARCH AND RESCUE:

The victim's party quickly regrouped. One rider rode back towards the pass to call for help while the remaining three riders searched for the missing victim. The survivors estimate it took about ten minutes to pinpoint his location and an additional ten minutes to dig down to him and establish an airway. He was buried roughly five feet deep next to his snowmobile, one ski of which was visible at the surface of the debris. They began CPR, which they continued for between 15 and 45 minutes with no success.

The rider who'd left the group was successful in contacting 911 on his cellphone at 3:38 P.M. An air ambulance from Boise reached the vicinity at 4:05 P.M. The air ambulance was unable to locate the survivors immediately, however, and then unable to land adjacent to the burial site. Eventually the helicopter landed about 0.4 miles and several hundred feet above the burial site. The survivors transported the victim to the helicopter, which flew him to the Camas medical clinic in Fairfield, where he was pronounced dead. Search and Rescue was dispatched but reached the site as the survivors were departing.

IN CLOSING:
We write these reports to ensure accurate information is available and to assist others who may encounter themselves in similar situations in the future. The Sawtooth NF Avalanche Center would like to acknowledge the skills, expertise and professionalism of those involved in this rescue operation.

MAP AND PHOTOS:

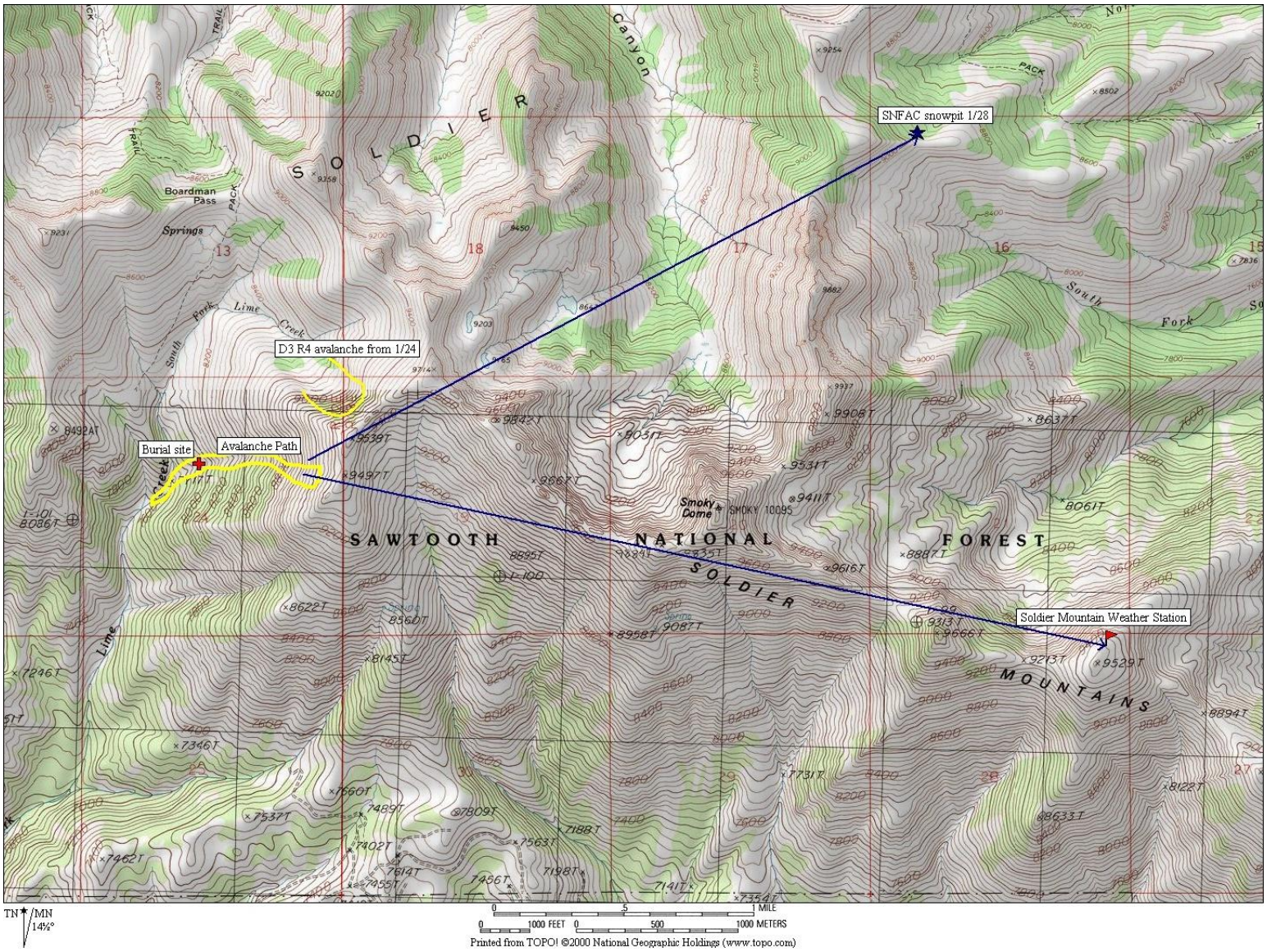

Figure 1: Map showing location of avalanche on the west aspect of Pt. 9538T.

Figure 2: Aerial view of accident site showing avalanche crown and burial site outlined in red.

Figure 3: Closer view of crown and starting zone.

Figure 4: Aerial view looking down avalanche path towards burial site (red X) and edge of debris (red line).

Figure 5: Closer view of deposition zone with burial site marked in red; debris continued down the gully below the area included in the image.

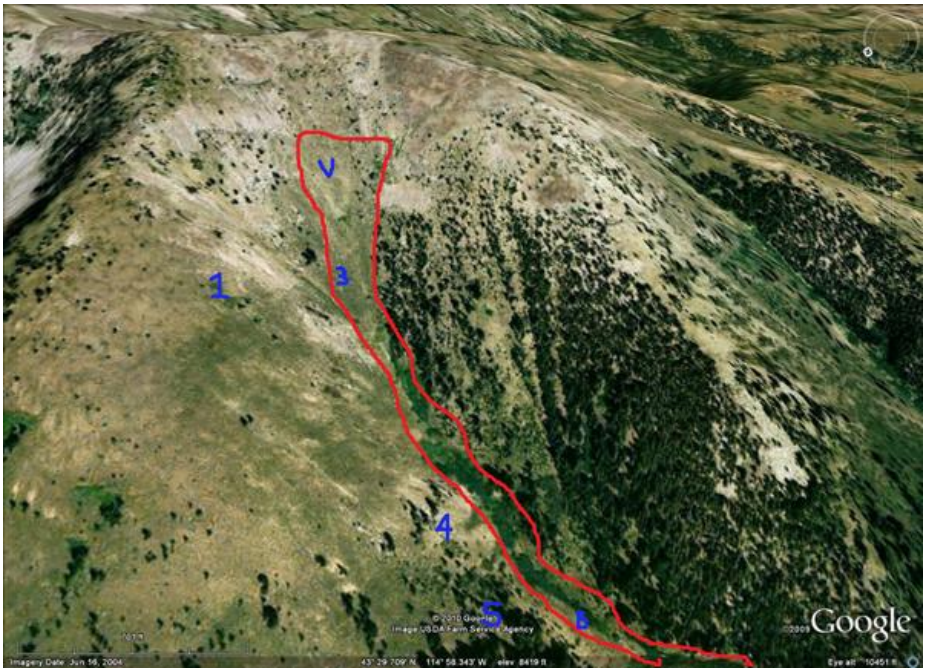

Figure 6: Overview of accident site showing reported positions of victim (V) and 4 other riders at time of avalanche. Approximate burial site marked as B.