

Henderson Mountain Avalanche Fatality

1 snowmobiler caught, fully buried and killed

Gallatin National Forest - 26 November 2014

Synopsis

Two snowmobilers were riding north of Cooke City, MT along the Daisy Pass Road under Henderson Mountain just past the turn to the Miller Road. At approximately 1245, Rider 1 (31 y/o) left the road and rode through a gap in the trees to a gully that opened to a 37 degree slope above him. His partner, Rider 2, remained on the road. Rider 1 triggered an avalanche and was buried about 5 feet deep, 100 feet from the road. The avalanche was not witnessed. His partner saw avalanche debris spill on to the road and began an immediate rescue. Using an avalanche transceiver and probe he located Rider 1. After 20 minutes (estimated), he uncovered the Rider 1's face. Rider 1 was unresponsive. Rider 2 then got help from another group of riders to fully extricate Rider 1 from the debris.

The avalanche danger was rated HIGH on all slopes and an Avalanche Warning had been issued for that day. The avalanche was approximately 300 feet wide and 2-3 feet deep. It ran 400 feet vertical on a southwest facing slope at 9450 feet. Average slope angle in the starting zone was 37 degrees. The alpha angle was 25 degrees. U.S. Classification of the avalanche is SS-AM-D2-R4.

GPS Coordinates:

Crown: [N 45.04174 W 109.94242](#)

Burial location: [N 45.03989 W 109.94394](#)

Toe of debris: [N 45.03964 W 109.94429](#)

Weather

Weather data come from two sites. Precipitation data come from the [Fisher Creek SNOTEL](#) (1.5 miles north) and wind data from a [GNFAC station at Lulu Pass](#) (2.3 miles north). The entire region experienced five days of extreme cold weather beginning the evening of November 10, 2014. The Fisher Creek SNOTEL recorded three days with low temperatures ranging from -13 F to -22 F. During that time Henderson Mountain had 16 inches of snow on the ground (3.1 inches of [snow water equivalent, SWE](#)). A series of storms followed (see below). In the 36 hours prior to the accident 2.3 inches of SWE fell which increased the snowpack water content by 40%.

November 13-16: 1 inch of SWE (8 inches of snow)

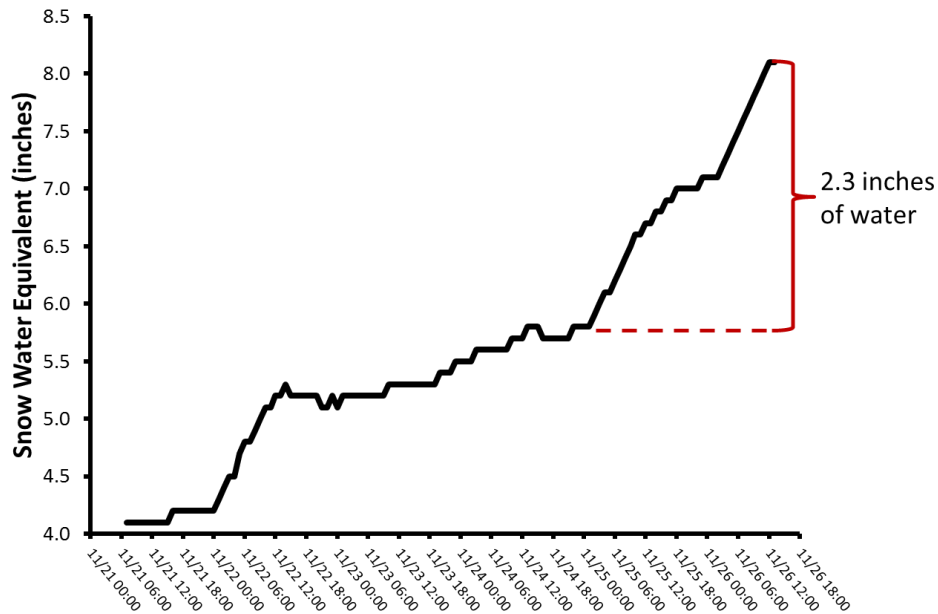
November 21-22: 1 inch of SWE (9 inches of snow)

November 23-25: 0.6 inches of SWE (5-6 inches of snow)

November 25-26: 2.3 inches of SWE (over 24 inches of snow) in 36 hours

During five days prior to this accident westerly winds averaged 15 mph and gusted to 35 mph. On the day of the accident winds were blowing 20 mph and gusting to 40 mph. At the scene of the accident winds were seen blowing from the NNW and loading the starting zone with wind-blown snow.

Snowfall data from the Fisher Creek SNOTEL



Snowpack

GNFAC Avalanche Specialist Mark Staples and a field partner were working in the area at the time of the accident. They experienced collapsing and cracking of the snowpack, a clear sign of instability. Visibility was very poor, but they observed one fresh avalanche on the northwest side of Henderson Mountain above Fisher Creek.

They investigated the accident site 3 hours after it occurred. The avalanche was approximately 300 feet wide and 2-3 feet deep. It ran 400 feet vertical on a southwest facing slope at 9450 feet. Average slope angle in the starting zone was 37 degrees. It failed on 0.5-1.0 mm faceted crystals, 10 inches (26.5 cm) above the ground.

These weak faceted crystals formed during very cold weather in the second week of November and were immediately capped by 8 inches of snow. At the end of the third week of November, another 9 inches of snow fell and stressed these weak faceted crystals. Following this storm a group near Lulu Pass reported collapsing and cracking of the snowpack, an early sign of instability. Snowfall continued to load the snowpack and stress this weak layer. During the 36 hours leading up to accident, another 2.3 inches of SWE (over 24 inches of snow) fell. This was a very heavy load of new snow.

The victim initiated a localized collapse (or failure) in the weak layer near the ground. This collapse propagated 400 vertical feet uphill causing the 2-3 foot thick slab to release. While on-scene, Cooke City Search and Rescue experienced collapsing as they stood on the debris.

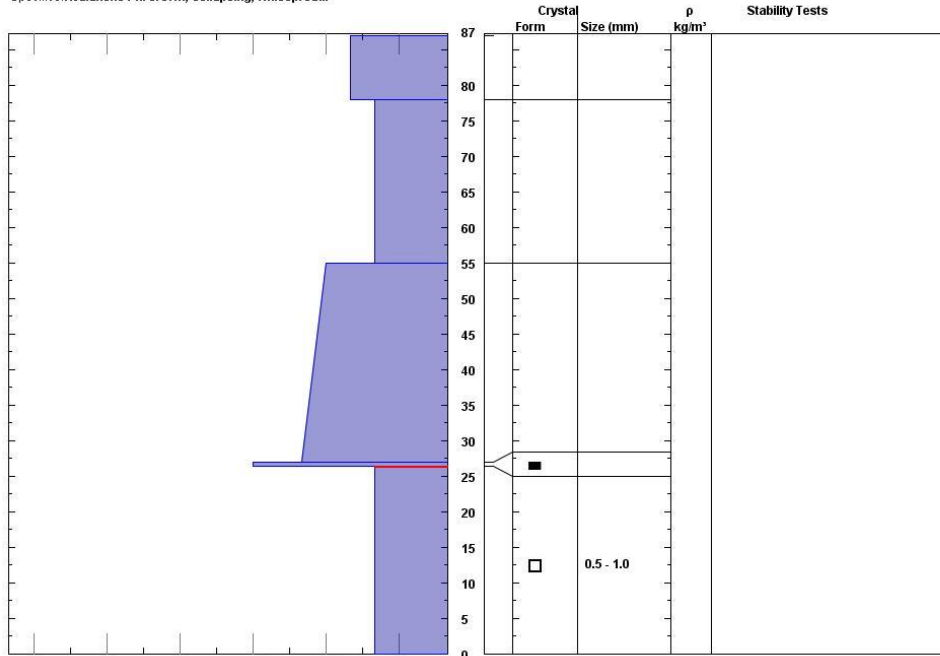
Snowpack profile from the avalanche crown face

Snow Pit Profile
Henderson Mtn
Beartooth, MT
 Elevation (ft) **9450**
 Aspect **210**
 Specifics: **Avalanche Pit: crown; Collapsing, widespread.**

Observer: **Mark Staples**
Wed Nov 26 16:00:00 MST 2014
 Co-ord: **45.04174 N 109.94242 W**
 Slope: **37**
 Wind loading: **yes**

Stability on similar slopes: **Very Poor**
 Air Temperature: **C**
 Sky Cover: **sky 0/8 covered**
 Precipitation: **Snow - 2 cm/hr**
 Wind: **Strong**

Stability Test Notes:
 Layer notes:
0-26.5: Problematic Layer



Notes: Crown from a snowmobile avalanche fatality. This avalanche was remotely triggered. The snowpack in many other areas was 3-4 feet deep.

Avalanche

Rider 1 was an experienced rider who had come to Cooke City for the last 8 years to snowmobile. His partner, Rider 2, had been coming to the area for the last 6 years. They were both wearing avalanche airbags and had shovels, probes, and avalanche transceivers.

They had just begun riding for the day when Rider 1 started to climb up a relatively flat slope through a narrow gap in the trees that led to a gully with a large, steep, open slope above it. Rider 2 remained on the road. They were both familiar with area. This gap in the trees and the gully is a popular place to climb.

A short time after Rider 1 left the road, his partner saw avalanche debris spill onto the road. It is not clear what Rider 1 was doing when the avalanche released. He was found buried next to the back of his snowmobile which was facing downhill on its right side. He had not deployed his avalanche airbag, and he was found lying face up about 5 feet deep, 100 feet from the road. His helmet was not on him. Based on the bottomless snow conditions and challenging riding, it is likely that he was not very far uphill of his burial location when the avalanche struck. Because no one witnessed the avalanche, it is unclear if Rider 1 was still climbing, had turned around, or was stuck and off his sled.

Search and Rescue

Rider 2 saw avalanche debris hit the road from where Rider 1 had just ridden. He called Rider 1's name out loud and then over their radios. When there was no answer he started a search with his avalanche transceiver which took him to the partially buried snowmobile. He began probing and pinpointed Rider 1's location near the back of the sled. He began digging and after about 20 minutes from when the avalanche happened, he had Rider 1's face uncovered. He needed help to get the rest of Rider 1 out. He remembered a group was nearby along the Miller Road and rode to get their assistance.

The group sent Rider 2 to Cooke City around 1320 to notify Search and Rescue. Once they got Rider 1 out of the debris, they performed CPR but it was unsuccessful. The avalanche happened around 1245, SAR was notified at 1330, SAR arrived on scene at 1340. They performed CPR and applied an AED. They performed five rounds of CPR and the AED never advised a shock.

Video from the scene: <http://www.youtube.com/watch?v=ofKDfNjJSEQ>

Avalanche Advisory and Avalanche Warning from 11-26-14:
<http://www.mtavalanche.com/advisory/14/11/26-0>

Photos:

Overview: <http://www.mtavalanche.com/images/14/henderson-mtn-fatality-overview>

Debris on road: <http://www.mtavalanche.com/images/14/henderson-mtn-fatality-toe-debris>

Crown: <http://www.mtavalanche.com/images/14/henderson-mtn-fatality-snowpack-layers>

Starting zone: <http://www.mtavalanche.com/images/14/henderson-mtn-fatality-starting-zone>

Burial site: <http://www.mtavalanche.com/images/14/henderson-mtn-fatality-burial-location>

Information in this report was gathered by Mark Staples who visited the site and interviewed Rider 2 and a member of the other group in person immediately after the accident.

Please direct any questions regarding this report to mstaples@fs.fed.us or 406-587-6984

Mark Staples
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Gallatin National Forest Avalanche Center