



AAC Publications

Triggered Slab – Inconsistent Snow Depth

Montana, Absaroka Range, Republic Mountain

On the morning of January 8, 2021, a group of six skiers (one female and five males) met in Cooke City and decided to ski the Fin on Republic Mountain. None of them had been to this particular slope or mountain before. All members carried an avalanche transceiver, shovel, and probe, and three were wearing helmets. Two carried avalanche airbag packs. All had at least some avalanche education. They had read the local avalanche forecast the day before, but not the day of this incident (the danger had not changed).

On their ascent, visibility was poor and they could not see the entire slope or the ridgeline they intended to climb. As they left the trees, they dug two pits and performed [stability] tests. One later wrote, "Though we identified potential weak layers at 60 cm and a deeper one... we got minimal failure and no propagation. What we saw in the pits was a nice right-side-up snowpack. However, we knew if we skinned along the ridge to the southwest, the snowpack would change due to wind exposure. We discussed mitigating this by skinning close to the ridge and skiing back down our skin track if we saw warning signs."

As they continued and "when those in the skin track crossed over a wind lip into a slightly more southerly aspect," they felt the slope collapse and watched a crack propagate 250 feet upslope. The avalanche broke 1.5 to two feet deep, 200 feet wide, and ran 700 feet vertically. Skiers 1 and 2 were carried the full distance to the base of the slope. Skier 3 was carried about midway downslope. Skier 4 was at the edge of the slide and able to hold their position, and Skiers 5 and 6 were further back in the skin track.

Skier 1 deployed his airbag and was partially buried. He freed himself from the debris and began a transceiver search. He followed the signal to Skier 2, whose head was buried more than two feet deep; the skier was unconscious and not breathing. Skier 1 cleared Skier 2's airway, and Skier 2 began breathing and regained consciousness. Skier 2 sustained injuries to his leg, but later made it out under his own power.

Skiers 4, 5, and 6 quickly skied down to help Skier 3, who was partially buried about halfway down the slide path and sustained serious injuries to his ribs and lungs. Skiers 4 and 6 had two-way radios and called for help. (There is no cell service in this region.) They were able to contact someone with a radio in Cooke City, who reported it to Park County Search and Rescue. Because Skier 3 could not move, the group eventually congregated at Skier 3's position, where they built a fire and waited for rescuers. Skier 3 was evacuated by helicopter at about 4 p.m., and the rest of the party was able to get out under their own power with the help of rescuers.

ANALYSIS

The avalanche occurred on an east aspect at 9,700 feet. The average slope angle was 37 degrees (33 degrees at the crown). The mountains near Cooke City had received heavy snow in October and November, which formed a dense, two-to four-foot-deep snowpack on many slopes. In late November to December, minimal snowfall and cold temperatures led to the formation of weak layers of sugary facets on some slopes, especially where the snowpack was relatively shallow. These layers were buried by subsequent heavy snowfall in late December, followed by small storms through the first week of January.

The skiers dug a six-foot-deep snow pit close to where the avalanche was triggered. They found good snow structure and good stability in their pit, which investigators confirmed the next day when they dug in the same spot. Approximately 100 feet away, with a slight change in aspect, the snowpack thinned from six feet to two to three feet deep. This thin area is where they initiated a fracture in the faceted grains.

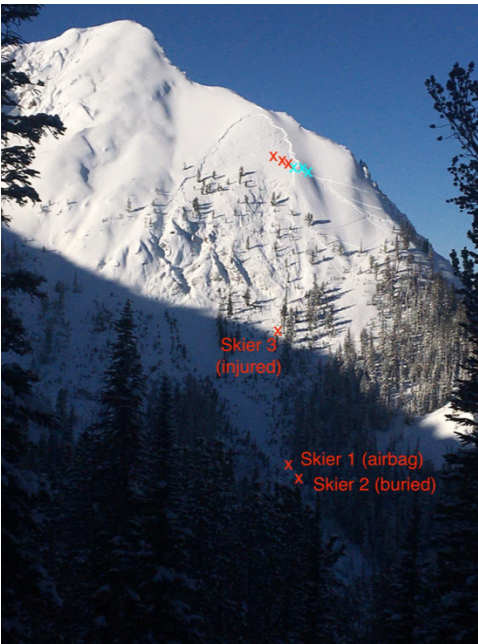
In a video produced at the accident scene (see video below) and in comments to viewers, Doug Chabot of Gallatin National Forest Avalanche Center said the snowpack was mostly six feet or deeper in the mountains around Cooke City at the time, but thinned in places at higher elevations and among rocky terrain. "Be really careful and paying attention to if the snowpack is changing as you're skinning along," he said. "As soon as [these skiers] wrapped around to a slightly different aspect, the depth and snow structure changed. A stability test is one of many pieces of info that goes into deciding whether to ski or not. A poor test result is enough to turn around, yet the absence of that is not a green light to move forward. Other things have to be going your way to give your decision weight... The bottom line is that you should know that the snow is very stable if you are considering entering large, highly consequential avalanche terrain like the Fin." (Source: Gallatin National Forest Avalanche Center.)

[Read the full report from Gallatin National Forest Avalanche Center.](#)

Images



Avalanche on the Fin of Republic Mountain. The skiers' skin track can be seen at right. The fracture they triggered propagated upward for 250 feet. The slide swept three skiers into the trees.



Location of skiers after the slide on Republic Mountain.



Measuring the crown of the avalanche on Republic Mountain.

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