THE ANATOMY OF AN AVALANCHE

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Avalanches involving people don't happen randomly. 90% of avalanche incidents are triggered by the victim or someone in their party. In order to play safely in avalanche terrain we need to understand what's happening with the snow.

Almost all avalanche deaths in North America are attributed to slab avalanches. A slab is a cohesive mass of snow that slides on an underlying weak layer. Slab avalanches are dangerous because they can fracture when we are on the middle of a slope, far from safety. Avalanches can accelerate to over 80 mph in seconds. Beneath the breaking slab the weak layer can break even faster, up to 200 mph, appearing to fracture the slope all at once like a shattered pane of glass. Avalanches happen lightning fast. One moment a person is happily skiing or riding, and the next they are swept downhill among tons of snow.

For an avalanche to occur four key ingredients are needed: a steep slope, a slab of snow, a weak layer and a trigger. If one of the four is missing, the slope will not avalanche.

The first ingredient is avalanche terrain, defined as an open slope over 30-degrees, about the angle of a Black Diamond ski run at a ski area. The second ingredient is a cohesive layer of snow, a slab. If there is snow in the mountains the first two ingredients are present. The third ingredient is a weak layer underneath the slab. When this layer collapses from too much weight it avalanches. The fourth ingredient is a trigger which adds weight or stress to the weak layer, causing it to break. Natural triggers are new snow, wind-loaded snow, rain or cornice falls, but the most worrisome are human triggers since most of the time we trigger the avalanches that kill us.

Many times during the winter slab avalanches are on the brink of fracturing and the weight of a person is all it takes to collapse the weak layer and start an avalanche. Weak layers are sensitive to stresses that are applied quickly, like a cornice breaking or the passing weight of a skier or

snowmobiler. If the weak layer is widespread and touchy the slab is on the verge of avalanching, primed for a trigger.

Every time it snows a new layer is formed in the snowpack. As these layers get buried by future storms the relationship between them determines the likelihood of triggering a slope. Some layers are strong, others are weak. A relatively stronger layer over a weaker one has avalanche potential. Certain slabs, like those densely packed by wind, resemble cement blocks, but others can be softer. An avalanche needs a slab of snow that's *relatively* stronger than the snow underneath. Even powder can fracture and act as a slab if it's sitting on a weak layer unable to support new snow.

Weak layers are a major piece in the avalanche puzzle, yet they can be difficult to identify. Surface hoar is a common weak layer. These crystals form at the surface, look like feathers and become a resilient weak layer once buried. This winter we are plagued with a weak layer at the ground from faceted, angular crystals that look and feel like sugar. These were formed early season from strong temperature gradients in the snowpack and are so loose you cannot make a snowball with them. They just fall out of your hand.

These avalanche basics are a first step in answering the question: "Can the slope slide?" Perhaps three of the ingredients are present, but is missing the fourth--you. Whether a slope avalanches or not is all about the timing and convergence of these four factors. Trying to figure out the stability of a slope can be complicated, and that's where we can help. Every morning we put out an avalanche advisory letting you know where these ingredients exist and where they do not. You can read it at www.mtavalanche.com or listen to it at 587-6981. Don't put on your skis or climb on your sled without checking it out.