

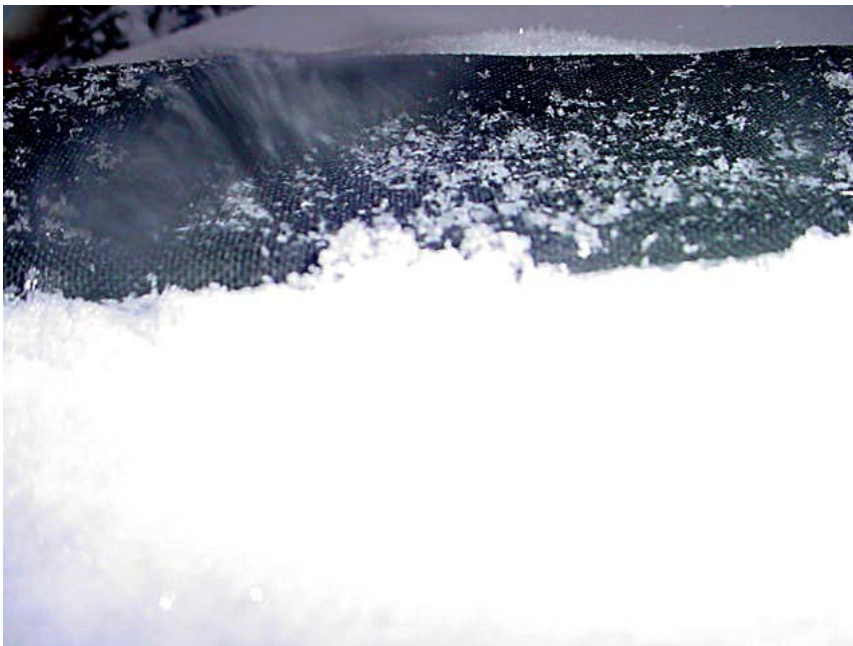
Back Country near Crystal Mountain —
Preliminary Report
Cement Basin Avalanche Incident
12/29/02—3:35 PM

Report compiled by Mark Moore (Director, Northwest Weather and Avalanche Center), Paul Baugher (Crystal Mountain Professional Patrol Director & Director, Northwest Avalanche Institute) and Dan Hudson (Sheriff's Office and SAR)

Incident Specifics

- Cement Basin, just N-NE of East Peak in the back country
- Elevation—6500 ft
- N-NE aspect
- 2ft x 200 ft slab
- Vertical fall approx 500 ft
- Failure on surface hoar formed December 22nd-24th
- Party of 7—3 telemark, 4 alpine touring
- Three partly buried, one totally buried
- One dead, one injured

Figure 1. Surface hoar found near bed surface at fracture line of fatal slab (photo by P. Baugher)



Incident Narrative:

On Sunday afternoon the 29th of December, a party of seven (Seattle Mountaineers) had hiked up from the Crystal Mountain base area to enjoy some powder on the northerly facing back country slopes

beyond the East Peak ridge in an area known as Cement Basin. They had already just skied a run on a nearby, slightly shallower angled slope with no incident, and most or perhaps all had skied the slope in question before (one individual had reportedly skied the slope many times before without any incident). The party had not checked in with the ski patrol (a voluntary service) for advice on stability prior to leaving the base area. They did not dig any snowpits. No test skiing was done prior to the incident. They indicated they had jumped on the snow on the corners of their switchbacked ski tracks and had “done ski pole and hand tests”. One member of the party indicated that he had talked to a friend that had skied in Cement Basin the day before without incident. They had looked at the avalanche forecast from the previous day (12/28/02) and all were carrying beacons, shovels and probes. The group had apparently all attended avalanche awareness courses, and some had attended a three-hour avalanche seminar several weeks before the incident.

At the time of the slide release, two members of the group had negotiated the slope without a problem and were at the base of the slope and off to the side (they were not hit by the slide itself but may have received some wind blast effects), three were in the path approximately 1/3 of the way down on the skiers left of the slope and approx 15’ apart. Two skiers had just entered the slope from the top when the slide released 1 ft behind the ski of the top-most skier. The slope released a 2 ft deep x 200 ft wide slide that ran about 500 ft vertical, partly burying three and totally burying one. After digging out the partly buried victims, the remaining six members of the group did a quick beacon search, locating the victim almost immediately and extracting him from the snow in approximately fifteen – twenty minutes. One of the partly buried victims sustained a lower leg fracture while the totally buried victim was found about 3-5 feet below the surface, face down and head below his skis. Already blue when recovered, the victim was found near a tree. The group attempted to revive the victim, but CPR was unsuccessful and a doctor in the party pronounced the victim dead at the scene. Although the victim had sustained some bruises to the forehead, it was subsequently determined by the medical examiner that death occurred as a result of suffocation, not trauma.

A rescue response was initiated by the Crystal Mountain ski patrol at 2:50 PM, after receiving the report from two witnesses who had assisted with the recovery of the victim. A ground team was sent to the site with one of the witnesses. Due to other parties signed out in the area a “rule out” of additional victims was first priority of the rescue mission.

The ground team met the Mountaineer group as they neared the ridge crest and provided assistance and transportation for the injured member. The ground team communicated to the ground rescue team that all of the party was accounted for. At approx 4:30 PM an army MAST helicopter was dispatched to the site, with Crystal Mountain Professional Ski Patrol personnel on board. Based on the report from the ground party, additional search personnel, including avalanche dogs and handlers, were put on standby. An overflight inspection accounted for tracks in and out of the slide area and visual contact with other parties known to be in the area at the time.

At this point the body was located and Crystal Mountain and MAST personnel were lowered from the helicopter with the use of a jungle penetrator. The site was inspected and the victim was extracted from the accident site and airlifted to Crystal Mountain, arriving at 5:00 PM.

Ancillary Avalanche and Snowpack Information—

Snowpack

A hard crust had developed in much of the Northwest approximately two weeks prior to the incident, during a heavy rain event to most elevations on December 14th. Subsequent to this rain episode, a series

of storms hit the Northwest, depositing some 20-40 inches of snow over the crust. However, shortly after the rain crust developed during a brief two-day break in storm activity, clearing skies had allowed for substantial surface hoar to form on the snow surface. This weak snow layer is a notorious weak layer for producing avalanche activity in many areas—especially in the Northwest where it has been documented as producing almost 1/3 of all avalanches during one winter near Snoqualmie Pass. In any case, this layer was buried by increased storm activity during the past week, and several reports of shooting cracks and very sensitive slab releases were thought to involve this weakness. From subsequent analysis of the avalanche fracture line it is probable that the slab in this incident released on the surface hoar layer.

Forecasts

For at least four days prior to the incident, avalanche forecasts for the Washington Cascades had discussed the increased probability of avalanche releases on one of several buried weak layers, including this layer of buried surface hoar. Several avalanche incidents reported earlier in the week near Mt Baker and Mt Hood had involved avalanches releasing on the buried weak layer, and on the morning of the incident, the Crystal Mountain Patrol had released several relatively large (2-5 ft crowns) slides releasing on the buried surface hoar layer. This information was included in the forecast that was issued around 8:30 the morning of the incident. In the 12/29/02 morning forecast, the following excerpt from the snowpack analysis alludes to some of the unstable snowpack conditions that may have existed in the area around Crystal Mountain:

Snowpack Analysis (NWAC Avalanche Forecast--12/29/02)

.....The key elements within the snow pack structure now consist of the rain crust formed in mid December with the recent heavy snows of the past week overlying it with several potential buried weak layers from 6 to 12 inches above the crust. Clearing last weekend allowed widespread surface hoar to form in many areas both west and east of the crest. This layer was subsequently buried by a light snowfall last Tuesday in most areas that fell with light winds. Additional low-density snow layers were deposited before heavy wet snow and or strong winds Thursday and Friday deposited denser layers or wind slab over these weak layers. Avalanches releasing on this buried surface hoar layer were seen earlier this week in the Mission Ridge area and on Saturday in the Crystal Mountain area. Ski area avalanche crews at Crystal Mountain on slopes that had not previously been controlled triggered numerous slab releases Saturday. These slides ranging from 1.5 feet to 5 feet deep released on buried surface hoar formed last weekend snow with one slide triggered from about a 20-degree deep slopes angle above a steep slope. These slide starting zones ranged from about 6300 to 6800 feet and were north facing. The wind slabs that released were formed during strong winds at fluctuating temperatures during precipitation events over the past few days. Numerous weak layers of low-density snow or the buried surface hoar layer along with the overlying wind slabs are maintaining a considerable avalanche danger, especially at higher elevations where winds have been strongest. Triggered slab releases are probable on lee slopes, mainly ranging from northerly through southeasterly facing above about 5 to 6000 feet.

Although the Friday AM forecast issued on 12/27/02 described current snowpack structure for Friday, some of the snowpack conditions that may have existed in the area of the incident were also mentioned. Unfortunately surface hoar can persist as a buried weak layer for some time once it has been buried intact—unfortunately it can also produce widely disparate results over short distances due to the inconsistent nature of its burial. However where it is buried, highly sensitive snowpacks often result:

Snowpack Analysis (NWAC Avalanche Forecast—12/27/02)

Recent new snowfall during the past 48 hours has ranged from around 12 inches up to over 30-40 inches, with heaviest amounts in the north Cascades, Olympics and Mt Hood area. Along with several buried weak layers, intermittently strong winds and currently rising freezing levels with snow changing to rain in some areas west of the Cascade crest, this weather has produced a significant increase in the avalanche danger. Increasingly dense wind slab, wet heavy snow or rain is being deposited over previous snowfall and either lower density snow layers from earlier this week or surface hoar from last weekend. This is resulting in larger and more unstable wind slabs becoming likely at higher elevations and probable at lower elevations. The greatest danger should be developing on northwest through northeast facing slopes near higher ridges and west facing slopes near the Cascade passes, but with shifting winds expected Friday afternoon, a variety of slope exposures should be loaded.

It should be noted that shooting cracks were reported in the Mt Hood area on some north and northeast exposure slopes above 6000 feet two days ago and this obvious sign of instability probably indicated surface slabs collapsing on buried weaknesses. While vegetation and other terrain anchoring below about 3 to 4000 feet are still helping to limit the avalanche danger in some areas, this anchoring is losing its grip on the snow pack and will be less of a factor with each new storm in the week ahead. As a result of the substantial increase in the danger, back country travel in avalanche terrain is not recommended Friday. In all areas back country travelers are urged to investigate the snow pack and use stability and shear tests to determine the location and extent of unstable slabs and their bonding to possible weak layers.