

# Avalanche Accident 12-13-2003

## Avalanche Burial and Recovery of Snowshoer

### South Fork Snoqualmie River Valley, Snoqualmie Pass, WA

- \* **Date:** Avalanche occurred around midday on Saturday, 12/13/03.
- \* **Location:** near Mushroom Couliir up the south fork of the Snoqualmie River valley from Alpentel Ski Area (approximately ½ mile up valley from Alpentel and 2 miles northwest of Snoqualmie Pass, WA)
- \* **Who:** 1 completely buried and killed; victim found on Saturday, 12/20/03
- \* **State:** WA
- \* **Activity:** snowshoe

Incident Date: December 13, 2003

Preliminary Report prepared on 12/27/03

Jon Barker and Paul Schuster, Alpentel Professional Ski Patrol

#### Accident and Rescue Narrative

**Saturday, December 13:** At 11:52 on Saturday, December 13, 2003 the Alpentel Ski Patrol received a report that a backcountry snowshoer had been caught in an avalanche on the Snow Lake Trail on the opposite side of the valley from the Alpentel Ski Area (North East of the S. Fk. Snoqualmie River). As Ski Patrol were dispatched the King County Sheriff's Department and SPART (a volunteer search and rescue organization) were notified.

19 inches of new snow had been recorded during the three days prior to the morning of the 13<sup>th</sup> and heavy snow fall continued throughout the morning. At the ski area's upper snow plot, 14 inches of new snow were recorded from 08:00 through 15:00. The Northwest Weather and Avalanche Center posted the following danger forecasts on their website (<http://www.nwac.noaa.gov/>) for Friday, the day before the incident: *Considerable avalanche danger above about 4000 feet and moderate below Friday. Avalanche danger increasing and becoming high above about 4000 feet and considerable below Saturday.* For Saturday, the day of the incident: *Avalanche danger increasing and becoming high above 4000 feet and considerable below Saturday especially Cascade passes.*

Due to the high avalanche danger, the responding ski patrollers traveled the safer route up-valley on the ski area side (South West of the S. Fk. Snoqualmie River) attempting to locate the scene of the avalanche through visual or verbal contact. En route, further reports indicated that the scene was on the ski area side of the valley and teams were redirected thusly.

At 13:09 the first ski patrollers arrived on scene after traveling up valley approx ¾ mile through several days worth of unconsolidated, trail-less snow. Had the avalanche hazard been substantially lower there would have been a direct route beyond the developed ski area and down to the avalanche site that the patrollers could have used.

The first patrollers on scene were soon joined by SPART. By this time 26 backcountry recreationists (all without transceivers, shovels, or probes) were at the scene helping search for the victim. They were rounded up, assigned numbers, and sent down the valley past checkpoints to the parking lot staging area.

While the area had been disturbed prior to the arrival of trained rescuers, comparative slides seen

throughout the day at Alpentel would indicated this was a soft slab, class III slide which may have been either a natural release or triggered by the snowshoers. Most of the crowns of slides released that day at Alpentel were about one foot in depth. The elevation at the scene was around 3500 feet. The path where the victim was caught was at approximately 100 feet wide and ran about 150 feet over about 50 vertical feet of drop. The slope angle was approximately 37 degrees with a NNE aspect.

Additional manpower and rescue equipment continued to arrive from the trailhead staging area and Alpentel's mountaintop dispatch. A ski area grooming machine cut a road half a mile up the valley floor to transport personnel and equipment. During the afternoon, 45 rescuers were on scene along with six avalanche rescue dogs. The entire field was fine probed and several dogs had moderate alerts but no strong alerts. All alerts were probed further and excavated to various depths. The average snowpack depth at the site was 7 feet. A majority of the debris in the deposition zone was 18 inches or less. On the extreme left flank of the path was a gully/terrain trap consisting of a large rock outcropping on the right of the gully, a cliff on the left, and constriction between them measuring 11 feet at it's narrowest. This particular area was probed and partially excavated by 12 to 18 rescuers. A traneiver search was made of the entire field twice with no signal detected. At 17:35 (one hour after dark) with continued snowfall and increasing avalanche hazard searchers were called back to the trailhead staging area with the intent to resume the next day.

**Sunday, December 14:** At daylight on Sunday December 14 with 23 inches of snow the previous 24 hours the Alpentel Patrol skinned in to the site and detonated several airblast explosions on sticks to ensure that the maximum number of rescuers would be able to safely work for the longest time that day. Despite the snowfall, natural sluffing and settlement had already decreased the avalanche hazard. After explosives use the avalanche hazard at the scene was considered low. King County Sheriff's Office was notified and rescue teams were sent in for the day.

Teams totaling 37 rescuers and multiple rescue dogs (some new to the scene) were on scene by about 09:00. The area was again fine probed and dogs searched the debris field including the gully area. Searchers left the scene by 16:30. The dogs again gave inconclusive alerts.

**Monday, December 15:** with 8 inches of new snow the previous 24 hour period, searching continued supplemented by three new dogs from the Crystal Mountain Ski Patrol.

**Saturday, December 20:** On the morning of Saturday, December 20<sup>th</sup> with 7 inches of new snow since Monday, two Alpentel patrollers arrived on scene with a RECCO device which had been shipped overnight from Howie at Alta. They searched the entire field supplemented by three more patrollers. Two portions of rock were found emitting a signal detectable to the RECCO. These were dug out to a depth of 6-7 feet to ground and eliminated as clues.

During the week, rescuers were mystified as to how multiple organized searches with dozens of people and 11 different rescue dogs could have missed someone – especially considering the relatively small size of the slide and area of deposition. However, as evidenced from the photos below, the search area was complicated by terrain and rock outcrops.

Photos below courtesy of Craig Wilbour, Rob Gibson, and Patrick Stanton

Figure 1. Slide path from above. Skier is standing in the gully between the rock (where victim was eventually uncovered) and the wall that confined the avalanche debris.



[click to enlarge](#)

Figure 2. Looking uphill into gully between rock and wall from below extrication site. Skier is in cave where victim was located.



[click to enlarge](#)

Figure 3. Incident scene looking uphill. Lead skier near victim's presumed location just before slide.



[click to enlarge](#)

Figure 4. Victim in position found under rock overhang. Snow line above shovel marks approximate level prior to search. Flags mark probe holes found during extrication.



[click to enlarge](#)

When the RECCO search was finished, four of us took up positions 12 feet below the narrowest part of the terrain trap (11 feet wide) and began trenching. Even though this area had been fine probed at least twice and had innumerable dogs working there we felt it was the best chance; that perhaps she had been pushed through the constriction and then “edded out” as the snow slowed down. Within 10 minutes of digging, about six feet below the surface, on the skier’s right side of the gully against the rock outcropping we noticed that the rock was dramatically undercut. A probe pole was passed at an angle down into the snow under the overhang. There was a probable strike immediately. Within a few shovelfuls, an ice axe, trekking pole, and snowshoe tip were uncovered. The victim was further uncovered, examined by a physician, and pronounced dead. The victim (female) was found prone lying across the fall line completely within the cave formed by the overhang. Her feet were near the mouth the cave while her head was toward the back. There was evidence of trauma and no evidence of an ice mask. The victim was extricated and transported from the scene. Portions of the victim were resting on exposed rock at the bottom of the cave where there was a small amount of running water. Her body was from a few inches to 4 feet inside of the overhang. No part of the victim or her gear extended outside of the overhang.

The terrain trap uncovered during extrication may help to explain why the victim was so difficult to locate. The rock she was found under is a column about 20 feet high with a snowy cap. A near vertical face of the rock parallels the slide path and forms the skier’s right hand wall of the gully for about 25 feet after which it becomes open slope. The bottom of this face has a cave measuring about 8 feet wide and 4 feet deep to the back whose roof is horizontal perpendicular to the fall line and trending uphill parallel to the fall line. The roof continued uphill for another 8 feet. If you were to “probe” straight

down from the top of the column to the victim you would go through 7 feet of snow then 12-13 feet of solid rock. After that, 16 inches of air space below the rock roof to the 16 inches of snow that covered the victim. While the victim was only under 16 inches of snow, one foot into the chute (climber's right of the rock) adjacent to the overhang held approximately 11 feet of snow to ground. The center of the chute was deeper yet. The face of the rock continued downhill another 6 feet to form the skier's right most wall of the chute.

One theory is that the victim was carried along the skier's left of the rock when she either slid or broke through into the "well" of the cave similar to sliding or breaking through into a tree well. 16 inches of snow then covered her and while the cave mouth was buried to a depth of 6-8 feet. This is speculation but could explain how she ended up traveling into the cave perpendicular to the direction of the slide.

Paint from the probe poles was found on the gully side of the rock face within 1-2 feet of where the overhang began. Probe holes were seen in the snow 12 inches into the gully from the vertical rock face and were present beyond the depth of the victim. Although the gully was partially excavated it would have been very difficult to probe sideways and get a strike. Unless one first dug into the snow 6-8 feet to get the proper angle and distance the rock would have been hit in most cases.

Several avalanche rescue dogs had moderate alerts in this area but seemingly more so 15-20 feet up the chute where the edge of the outcropping stops. Although there is no way to know, it may be that the victim's scent traveled up the overhang and not out into the gully. It also may have been diffused by the open cavern and running water and/or concentrated up the gully further.

## **Ancillary Snowpack and Weather Information**

Prepared by Mark Moore, NWAC

On the day prior to the accident and the day of the accident, substantial avalanche danger was anticipated in the Washington Cascades. In fact, an *Avalanche Watch* was for significantly increasing danger was posted on the morning forecast on 12/12/03, and an *Avalanche Warning* was issued the following morning on 12/13/03. Although the danger decreased significantly by early in the week, increasing snowfall combined with rising freezing levels produced further periods of considerable to high danger near the accident on Tuesday, the 16<sup>th</sup> and early on Wednesday the 17<sup>th</sup>, further complicating and slowing search and rescue efforts.

### **NWAC Forecast for Friday, 12/12/2003**

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 BACKCOUNTRY AVALANCHE FORECAST FOR THE OLYMPICS, WASHINGTON CASCADES AND MT HOOD AREA  
 These forecasts apply to back country avalanche terrain below 7000 feet. They do not apply to highways or operating ski areas.  
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9 AM PST Friday 12 December 2003  
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ZONE AVALANCHE FORECASTS...

OLYMPICS...

...AVALANCHE WATCH FOR SATURDAY...

Considerable avalanche danger above about 5-6000 feet and moderate below Friday especially west Olympics. Avalanche danger increasing and becoming high above about 5-6000 feet and considerable below Saturday especially southwest Olympics.

WASHINGTON CASCADES NEAR AND WEST OF THE CREST...

...AVALANCHE WATCH FOR SATURDAY...

Considerable avalanche danger above about 4000 feet and moderate below Friday. Avalanche danger increasing and becoming high above about 4000 feet and considerable below Saturday.

MT HOOD AREA....

...AVALANCHE WATCH FOR SATURDAY...

Considerable avalanche danger above about 5000 feet and moderate below Friday. Avalanche danger increasing and becoming high above about 5000 feet and considerable below Saturday.

EAST SLOPES WASHINGTON CASCADES....

Moderate avalanche danger above about 5-6000 feet and low below Friday. Avalanche danger increasing and becoming considerable above about 5-6000 feet and moderate below Saturday.

OUTLOOK TO SUNDAY...

Avalanche danger decreasing Sunday becoming considerable above about 4-5000 feet and moderate below in the Olympics and near and west of the Cascade crest. East of the crest expect a considerable avalanche danger above about 6000 feet and moderate below.

SNOWPACK ANALYSIS...

A few days of periodic light snowfall and cool temperatures was generally seen the last few days. This lower density snow accumulated on higher density snow or a crust produced during a period of heavier precipitation and warmer temperatures the first week of December. No skier-released avalanches have been reported to the NWAC the past few days and older snow layers should have stabilized to some extent during that period. However the weather pattern and the avalanche potential has begun to change on Thursday night. About 4-13 inches of new snow is reported on Friday morning in the Cascades near and west of the crest. This snow has fallen with moderate southwest to west winds along the ridge tops, east winds in the Cascade passes, and slightly warmer temperatures at higher elevations. This should have begun to cause a greater potential for slab layers on steeper lee slopes. Lower density snow and possible small hoar frost that may have developed early in the week during the occasional fair cool weather would contribute to this potential. The best chance for new slab layers should be on north to east aspects at higher elevations and on more westerly aspects in the Cascade passes.

Friday...

Further moderate southwest to west winds along the ridge tops, east winds in the Cascade passes, light to moderate snowfall mainly near and west of the Cascade crest, and slightly warmer temperatures are expected on Friday. This should help maintain slab layers on some lee slopes. This should continue to be mainly north to east slopes at higher elevations and on more westerly aspects in the Cascade passes. Back country travelers should use increasing caution and safe travel techniques such as one at a time travel near or on steep lee slopes on Friday.

Saturday...

A strong front is expected to slowly cross the Olympics and Cascades on Saturday with the heaviest rain or snow in the south Cascades and Mt Hood area. This should be accompanied by increasing strong southwest winds along the ridge tops, warmer temperatures, a change from east to west winds in the Cascade passes, and moderate to heavy rain or snow especially in the south Cascades and Mt Hood area. Slab layers should be expected to develop on Saturday on lee slopes. This should continue to be north to east slopes at higher elevations but on more varied aspects in the Cascade passes. Back country travel on or near steep avalanche terrain is not recommended on Saturday with natural or triggered avalanches becoming likely by Saturday afternoon.

Outlook to Sunday...

Decreasing west winds, moderate to heavy orographic snow showers and cooler temperatures are expected on Sunday. This should allow recent slab layers to begin to partly stabilize on some slopes but slab layers will probably be maintained on other steep lee slopes. It should be a good idea to let new snow layers stabilize on Sunday and wait for the better weather expected Monday to make a trip into the back country.

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### **NWAC Forecast for Saturday, 12/13/2003**

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BACKCOUNTRY AVALANCHE FORECAST FOR THE OLYMPICS, WASHINGTON CASCADES AND MT HOOD AREA

These forecasts apply to back country avalanche terrain below 7000 feet. They do not apply to highways or operating ski areas.

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 9 AM PST Saturday 13 December 2003  
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 ZONE AVALANCHE FORECASTS...

OLYMPICS...

Avalanche danger increasing and becoming high above 5-6000 feet and considerable below Saturday especially southwest Olympics. Avalanche danger decreasing and becoming considerable above 5-6000 feet and moderate below Sunday especially west Olympics.

WASHINGTON CASCADES NEAR AND WEST OF THE CREST...  
 ...AVALANCHE WARNING...

Avalanche danger increasing and becoming high above 4000 feet and considerable below Saturday especially Cascade passes. Avalanche danger decreasing and becoming considerable above 4000 feet and moderate below Sunday.

MT HOOD AREA....

High avalanche danger above 6000 feet and considerable below Saturday. Avalanche danger decreasing and becoming considerable above 5-6000 feet and moderate below Sunday.

EAST SLOPES WASHINGTON CASCADES....

Considerable avalanche danger above 5-6000 feet and moderate below Saturday. Avalanche danger decreasing and becoming considerable above 6000 feet and moderate below Sunday.

SNOWPACK ANALYSIS...

Periodic light snowfall and cool temperatures was generally seen during the early and middle part of last week. This lower density snow accumulated on higher density snow or a crust produced during a period of heavier precipitation and warmer temperatures the first week of December. Older snow layers should have stabilized to some extent during that period. However the weather pattern and the avalanche potential began to significantly change on Thursday night. About 4-13 inches of new snow was reported on Friday morning in the Cascades near and west of the crest. Another 3-9 inches was reported on Saturday morning. This snow has fallen with moderate to strong south to southwest winds along the ridge tops, mostly east winds in the Cascade passes, and an overall warming trend. This is generally likely to be causing a greater potential for slab layers on steeper lee slopes. Lower density snow from early in the week could contribute to this potential. We have reports from most of the ski areas near and west of the crest in the Washington Cascades of fairly extensive easily triggered 4-10 inch soft slab layers on Friday including at Mt Baker, Stevens, Snoqualmie and Crystal. Some natural 10 inch slab avalanches on 35 degree north aspects were also reported by the Mt Baker ski patrol on Friday morning. The best chance for further developing new slab layers should be on north to east aspects at higher elevations and on more westerly aspects in the Cascade passes but slab layers may be possible on other aspects as well. Along the Cascade east slopes the Mission Ridge ski patrol on Friday reported that easily triggered 8 inch slab layers were found at higher elevations near ridges. Also it seems likely that the potential high avalanche danger is more restricted to higher elevations at Mt Hood since rain is reported to 5-6000 feet on Saturday morning and the snow pack there at lower elevations may have already somewhat consolidated and partly stabilized.

Saturday...

A strong front is expected to slowly cross the Olympics and Cascades on Saturday with the heaviest rain or snow in the south Cascades and Mt Hood area. This should be accompanied by southwest winds along the ridge tops, warmer temperatures, another change from east to west winds in the Cascade passes, and moderate to heavy rain or snow especially in the south Cascades and Mt Hood area. The increasing density snowfall or possible rain depending on location should cause slab layers to develop or be further loaded Saturday on lee slopes. This should continue to be north to east slopes at higher elevations but on more varied aspects in the Cascade passes. Back country travel on or near steep avalanche terrain is not recommended with natural or triggered avalanches becoming likely Saturday.

Sunday...

West winds along the ridge tops, snow showers and cooler temperatures are expected on Sunday, with yet another potential change from east to west winds in the Cascade passes. Snow showers should be heaviest Sunday afternoon in the north and central Cascades. This weather should begin allow previous recent slab layers to begin to partly stabilize but storm cycle slab layers should still be possible on steep lee slopes. This should be most likely to northeast to east aspects at higher elevations or on more varied aspects in the Cascade passes. It could be a good idea to hit the ski areas on Sunday and let new back country snow layers

stabilize for a day or wait for the better weather expected Monday before making a back country trip.

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