Mt Hood Meadows, Clark Creek Fatality Report
April 5, 2022

Report By: Dennis D'Amico, Dallas Glass, and Andrew Kiefer

Incident Summary

After extensive review, we are unable to conclude whether the snowboarder's death due to asphyxiation was more likely caused by snow burial from an avalanche or immersion in deep snow. In this report, we will summarize key information, identify likely timelines and scenarios, and list our remaining questions.

At 10:55 am on April 5, 2022, the victim rode the Shooting Star chair lift at Mt Hood Meadows Ski Resort. While his exact downhill route is unknown, he made his way to a short, narrow, and very steep path locally known as "Patty Cakes" in the Narrows area of Clark Canyon. Patty Cakes is located between the bottom of "JD'S" and "FBW" on a trail map. During his solo descent, he fell and came to rest in the creek at the bottom of the slope. This time of year the creek is partially snow-filled with steep, open holes exposing running water. The change in slope between the path and the creek is very abrupt and forms a classic terrain trap that is even more dangerous in areas where holes and open water exist. The cause of the fall is unknown. It may have been the result of difficult terrain, surface conditions, a small loose avalanche, or a combination of these factors. Unfortunately, the victim was not located for several days. Active melting and subsequent avalanche cycles obscured surface clues that may have provided a better understanding and reconstruction of the accident.

The rider was reported missing the evening of the 5th around 9:30 pm. Search and rescue efforts began that night and continued on April 6th and 7th, involving multiple organizations. Late on the afternoon of Friday, April 8th, a Mt Hood Meadows ski patroller was searching the area and spotted a small section of the victim's snowboard. The body was located in a deep creek hole at the base of Patty Cakes path. Due to the difficult and dangerous extrication, the body was not retrieved until April 9th.

Mt Hood Meadows Ski Patrol, NWAC, and the Hood River County Medical Examiner conducted an investigation on April 11 and 15th, including a site visit by all parties. Mt Hood Meadows Ski Patrol provided NWAC with extensive information surrounding the terrain, the incident, and avalanche mitigation results from that morning. NWAC staff compiled the information below. Please see the end of the document for important definitions relative to this incident.

Terrain

All of the terrain, including the accident site, is within Mt Hood Meadows Ski Resort. Clark and Heather Canyons originate high on Mt Hood's SE face at around 9000 ft, where permanent snowfields feed Clark Creek. The two drainages merge around 5600 ft and become one flat bottom valley. The canyon's walls constrict just below the bottom

of the Heather chairlift (5200') and form a choke known as The Narrows. The side walls are very steep and dotted with short cliffs. The western wall of the Narrows comprises a series of very steep and rocky chutes that terminate abruptly in the much flatter canyon bottom. (Image 1) Clark Creek runs along the base of this wall and many of these chutes end on or near the main creek channel. A groomed track extends from near the Heather Chair to the HRM Parking lot at 4560' and passes near the creek at the base of these short slide paths.

Patty Cakes begins as a slope of around 30-35 degrees with large timber. According to Mt Hood Meadows Ski Patrol, an avalanche has never been recorded in the upper area. The treed slope narrows into a tight gully comprising the avalanche path. The start zone has a slope angle of 45 degrees before it further narrows and steepens to 60 degrees mid-path with rocks and alder. A small apron sits just above Clark Creek. The entire chute is relatively short at only 90'. Because of its short length, narrow width, and steep pitch, this slide path typically only produces small (D1) loose or soft slab avalanches. (Image 3)

The Narrows area in general, including Patty Cakes, was not "ridable" up until this storm due to low snow cover caused by warm temperatures during the 2nd half of the winter. On the day of the accident, an open creek hole existed in the creek just skiers' right of the path's apron. This terrain was open, accessed through a gate, rated double black diamond/expert terrain, and within the ski area's permitted boundary. To enter this area, a rider would encounter 4 disks at each open gate that state " Caution", "Avalanche Area", "Creek Below" and "Cliff Area".

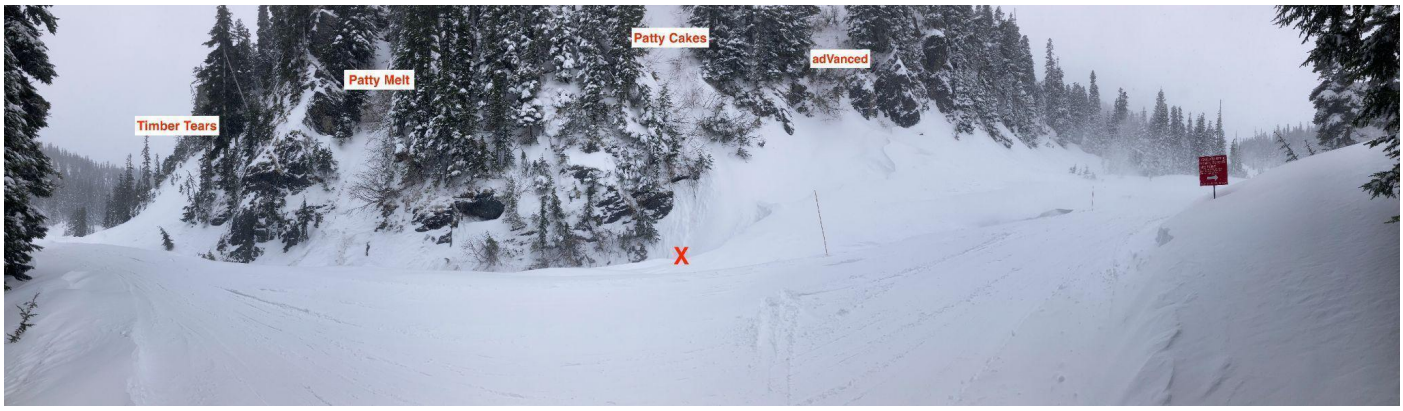

Image 1: The Narrows area of Clark Canyon showing the steep western wall and four of its short steep paths including Patty Cakes. The victim's approximate burial location is marked with the red X. (Photo: Andrew Kiefer, Apr 11, 2022)

Image 2: [Mt Hood Meadows Ski Area Trail Map](). Fatality area with Red X.

Image 3: Patty Cakes path as seen from the groomed track in the Narrows. (Photo: Andrew Kiefer, Apr 11, 2022)

Image 4: Google Earth with burial site marked by Red circle.

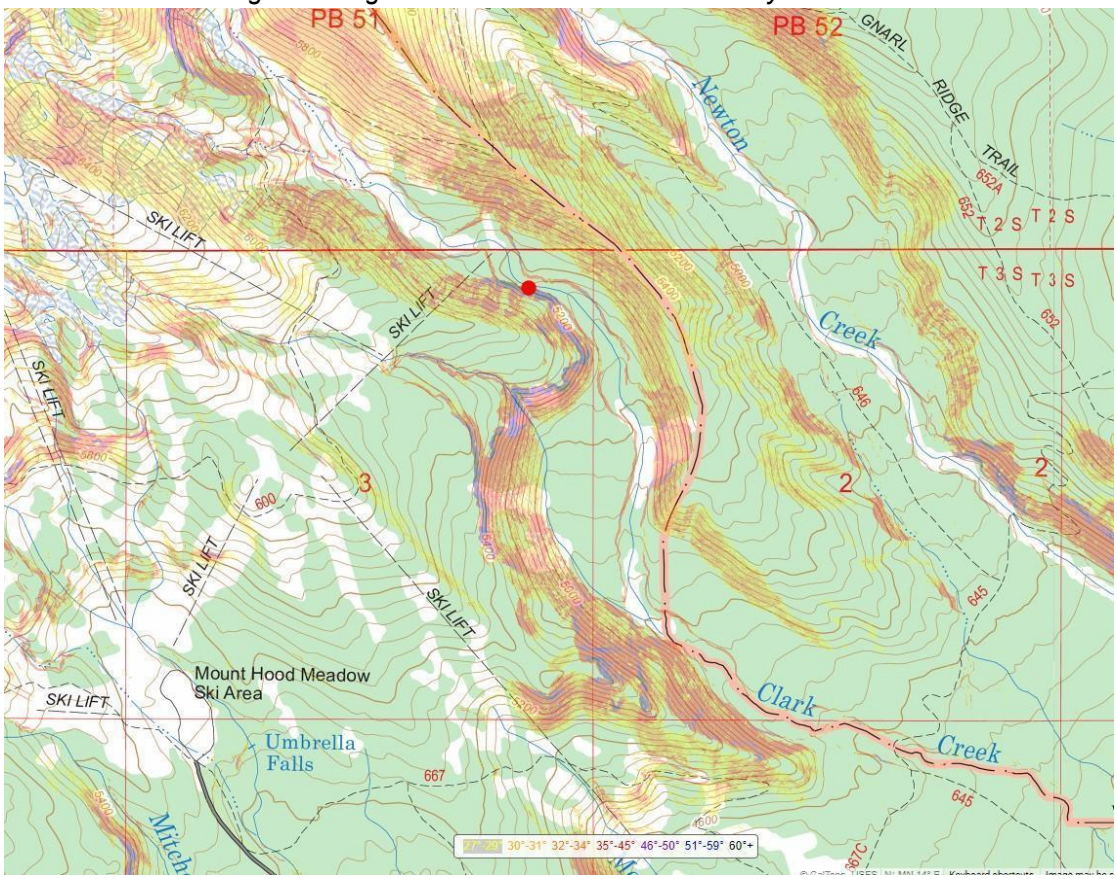

Image 5: Topographic map with burial site marked by Red circle

Snowpack and Weather Summary

After a long dry and warm period in late March, a strong winter storm impacted the Mt Hood area beginning the night of April 3rd. Prior to the storm, most snow surfaces were characterized by a firm melt-freeze crust. Neither NWAC nor Mt Hood Meadows Ski Patrol were concerned about deeper layers in the snowpack. Stormy weather on April 4th with very strong and gusty winds caused the resort to close for much of the day. Ski patrol's travel on the mountain was very limited due to the stormy conditions. (Image 6) By the morning of April 5th around 26" of snow had fallen over the melt-freeze crust with cool temperatures. An NWAC forecaster skiing at the resort on April 5th measured 20" of settled storm snow above the early April crust in nearby terrain. While snowfall continued during the day, precipitation intensity and wind speeds had decreased.

Following the accident, a high-pressure ridge built over the Pacific Northwest causing temperatures to warm rapidly. Freezing levels rose from near 2500' on April 5th to 11,500' on April 7th. NWAC issued a special avalanche bulletin due to the uniquely dangerous conditions from the sudden swing in the weather. This warm and sunny period accelerated snowpack settlement and melting on nearly all slopes. By Friday, another winter storm was approaching the region with cooling temperatures and additional snowfall.

After the ski area closure on April 4th due to inclement weather, Mt Hood Meadows Ski Patrol conducted avalanche mitigation measures on the morning of the 5th. This included the Narrows area. Hand charges were placed on sticks of bamboo as air-blasts near the base of four of the paths in the Narrows area including Patty Cakes. Patrollers observed a D1 loose dry avalanche in the chute and a very small and localized crown near the blast site. Patrol estimated the avalanche involved less than 5% of the path. Patty Melt, one path East of the incident site, produced a shallow D1, 6" soft slab avalanche with a similar shot placement. (Image 8)

The most notable result from the morning's mitigation efforts occurred on nearby God's Wall, where an explosive released a D2.5 soft slab. After completing avalanche mitigation on the 5th, ski patrol opened a limited section of Heather and Clark Canyons via access gates from Moon Bowl to Chair Line including Jack's Woods.

An off-duty NWAC forecaster skied through terrain accessed from the Shooting Star chairlift around 10:45 am. He dug a small hand-pit in Jack's Woods (Image 7) and photographed the crown in Patty Melt (Image 8), before making his way further down the canyon to near the runout of God's Wall and ultimately the HRM parking lot. He noted heavy skier traffic in the open terrain.

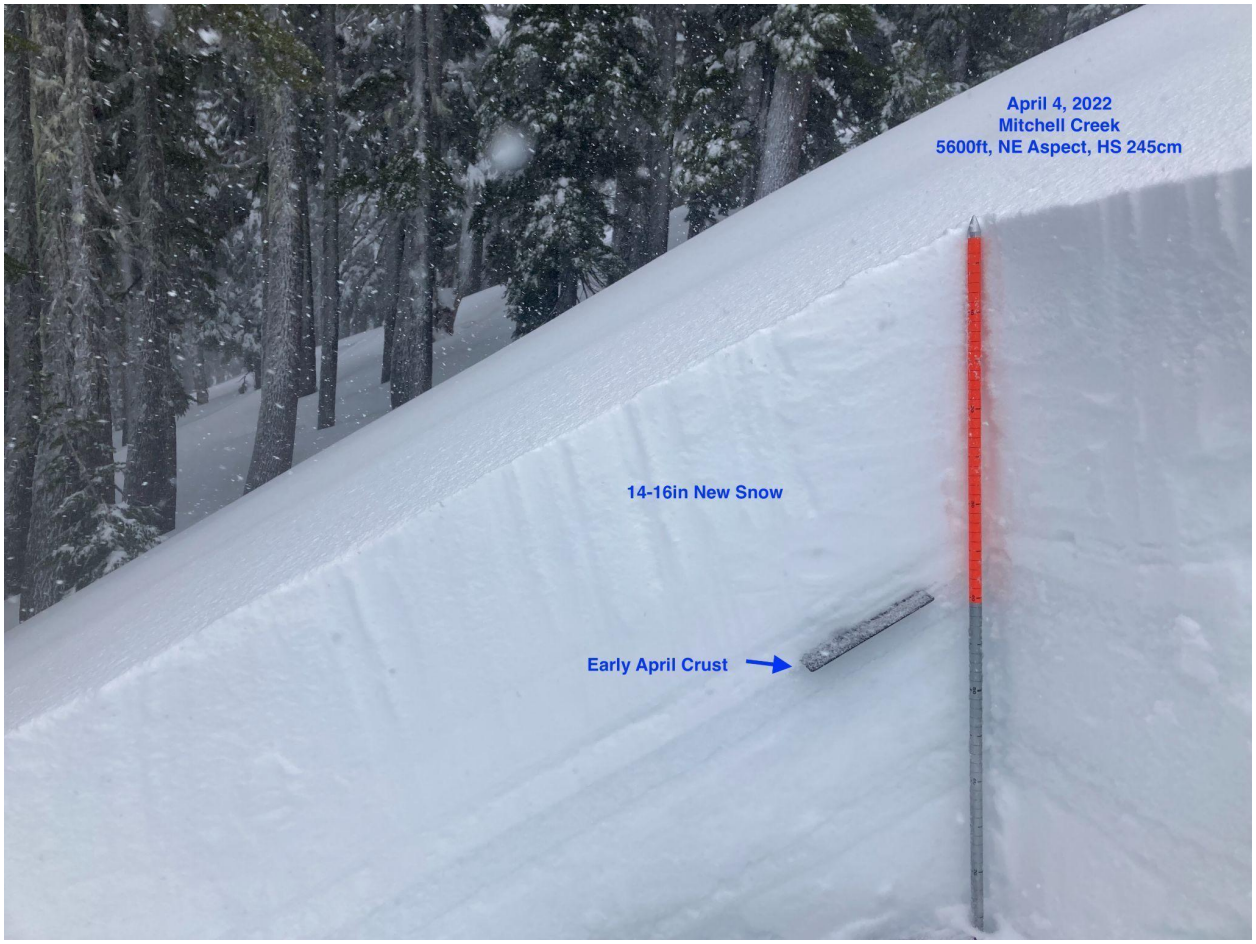

Image 6: Profile showing new storm snow over early April crust in Mitchell Creek on Mt Hood. Photo: Andrew Kiefer, Apr 4th, 2022

Image 7: Handpit showing new storm snow over early April crust in Jack's Woods. Photo: Andrew Kiefer, Apr 5, 2022

Image 8: The shallow crown from MHM ski patrol's mitigation efforts in nearby Patty Melt Path. This photo was taken approximately an hour before the accident. (Photo: Andrew Kiefer, Apr 5, 2022)

Accident Summary

At 10:55 am the victim's ski area pass was scanned at the bottom of the Shooting Star Chair. He eventually made his way down-canyon towards the top of the Narrows area. The rider was very familiar with Mt Hood Meadows resort and an expert snowboarder according to his family. They also communicated that Jack's Woods was one of his favorite riding locations. It is unknown if he had previous experience with the Narrows paths, including Patty Cakes. At some point during his descent, the rider fell or was pushed into the creek below.

The off-duty NWAC forecaster passed back for a second time through the Narrows area around 11:55 am traveling within 50 ft of the creek hole at the base of Patty Cakes. He was traveling slowly down canyon on the out track and did not notice any signs of new avalanche activity. However, he did not specifically stop at the base of the Patty Cakes path and may not have noticed the effects of small avalanches, or additional skier traffic in the terrain. Mt Hood Meadows Ski Patrol reported ski/rider tracks in the area on the day of the accident.

Recovery Summary

At around 9:30 pm on Tuesday, April 5th, the victim's girlfriend reported him missing. Initial search efforts that evening were limited but focused on Jack's Woods because of the victim's preference for riding in that location. On the morning of April 6th, Mt Hood Meadows Ski Patrol and Hood River County SAR conducted a search of the area including the Narrows. Over the 2 day search, rescuers passed within at least 20-50 ft of the burial location numerous times and did not notice any evidence of a fall or fresh avalanche debris.

Search efforts continued on April 7th. Avalanche mitigation was conducted by Meadow's patrol in the resort due to the warming weather during this time period. Rescuers traveling in the area and snow shedding from nearby trees and rocks added layers of debris to the lower part of the paths, including at the accident site.

Late in the afternoon on Friday, April 8th, a ski patroller was searching the bottom of Clark Canyon near the Narrows. He saw a small section of the red base of the rider's snowboard down in a creek hole. The patroller was able to descend into the hole and confirm the victim's location with an avalanche probe. The small section of the snowboard and part of one glove were the only visual signs of his location. (Images 9, 10) Due to the late hour and potential dangers, the body was not recovered until the following day.

The rider was found on his back covered by approximately 1 foot of snow, including an inch or two that had accumulated during the storm on April 8th. His head was positioned down canyon and his snowboard was still attached. His right arm was bent upward at a 90-degree angle and missing its glove. His helmet, facemask, and snowboard were all still on his person and in the correct position. There were no signs of trauma. His facemask was still in place and no snow was in his airway. A branch was found tangled with his left hand, strongly suggesting that he tried to stop a fall from the chute instead of accidentally riding into the open hole from the nearby groomed trail.

Mt Hood Meadows Ski Patrol communicated to NWAC staff Friday afternoon 4/8 that they had found the missing snowboarder and they determined the incident was likely an SIS-related fatality.

Media reports on Sunday 4/10 stated the accident was an avalanche fatality. Beginning on Monday, 4/11, NWAC coordinated with Mt Hood Meadows Patrol, the Hood River County Sheriff's Office, and Hood River County medical examiner to conduct an investigation. This included a site visit and interviews by an NWAC forecaster on Monday, April 11th, and a coordinated review and site visit by Ski Patrol, the NWAC forecaster, and the county medical examiner on Friday, April 15th. The Hood River County medical examiner ruled the cause of death asphyxiation secondary to snow immersion and did not find any signs of trauma.

Image 9: Burial site in Clark Creek. Photo: Andrew Kiefer Apr 11th, 2022.

Image 10: Burial site in Clark Creek looking up the Narrows. Photo: Andrew Kiefer, Apr 11th, 2022.

Conclusions and Discussion Points

What we know or think is very likely

It is very likely the solo snowboarder fell in very steep and extreme terrain that led into a deep creek hole, or terrain trap. Avalanches were observed in the immediate area on the day of the accident. It is very likely some snow fell with him into the deep creek hole and helped at least partially bury him. This snow may have originated from the avalanche path and/or the sides of the creek hole itself. It is also very likely that if an avalanche occurred, it was very small. He was recovered nearly 4 days after the last time his ski area pass was scanned. Avalanches were also observed in the area on the day of the recovery and it is very likely that additional debris covered the burial site.

Information and Open Questions that make the determination of avalanche fatality or snow immersion suffocation fatality murky

- Why did he fall? Surface conditions, very steep terrain, a small avalanche, or a combination of these factors could have led to a fall.

- Was moving snow (an avalanche) a complicating factor in the fall and asphyxiation?
- How much loose snow had already sluffed from the very steep terrain down into the area where he fell?
    - Was there sufficient snow remaining to bury the victim in this terrain trap?
    - How deep was the initial burial?
- Was he conscious after the fall? The Hood River medical examiner could not conclude whether the victim was conscious after the fall.
    - If he had been conscious, significantly more snow would be needed to prevent him from extracting himself from the snow.
    - A full autopsy was not performed, but no signs of trauma were observed.
- Rescuers did not note an ice lens around the victim's mouth.
    - Given the amount of time that passed before the victim was recovered, this piece of information is inconclusive.
- With the helmet, goggles, and facemask intact and still on the victim's face, if an avalanche did occur with the fall it was not powerful enough to affect his headgear.
- How much did his body orientation and the overall positioning of the snow block where he was found change over the following warm days?

Discussion:

-This accident reveals the potential continuum between avalanche and SIS fatalities. It also reveals a potential for these categories to obscure the most important point which is that the victim had a bad fall in a very dangerous place in the terrain. Terrain like this is the deciding factor in survival because it increases the consequences of falls, avalanches, and burials.

-Traveling with a partner, even inbounds, on a powder day could have resulted in a very different outcome. Fatalities caused by small avalanches or SIS could be prevented if a partner is nearby and equipped to help the victim extricate him/herself.

-If this was an avalanche fatality, the avalanche would most likely be rated as a D1 (small) on the avalanche size - destructive force scale given the piece of short very steep terrain. Events like this highlight the potential for even small amounts of snow to have dire consequences when they involve terrain traps.

-Initial media reports can be incomplete and may not consider the full scope of the incident. Press releases from Saturday the 10th stated the victim was found under avalanche debris, but this does not necessarily mean that he was killed by an avalanche. Given how much time had passed and the location the victim was found, it's inconclusive how much subsequent avalanching may have occurred (and contributed to the burial) over a period of 4 days.

Appendix:
Important Definitions

LOOSE SNOW AVALANCHE is an avalanche that releases from a point and spreads downhill collecting more snow - different from a slab avalanche. Also called a point-release or sluff.

Loose snow sliding down a mountainside is called a loose snow avalanche. Small loose snow avalanches are called Sluffs. Loose snow avalanches can be dry or wet.

Loose snow avalanches usually start from a point and fan outward as they descend, and because of this they are also called “point releases.” Very few people are killed by loose snow avalanches because they tend to be small and they tend to fracture below you as you cross a slope instead of above you as slab avalanches often do. The avalanche culture tends to minimize the danger of loose snow avalanches, sometimes calling them “harmless sluffs.” But, of course, this is not always the case. Houses have been completely destroyed by “harmless sluffs,” and if caught in one, it can easily take the victim over cliffs, into crevasses or bury them deeply in a terrain trap such as a gully. Most of the people killed in sluffs are climbers who are caught in naturally-triggered sluffs that descend from above–especially in wet or springtime conditions. Also, wet loose snow slides consist of dense, heavy snow and can sometimes grow to large and destructive sizes.

Sluffs can actually be a sign of stability within the deeper snow when new snow sluffs down without triggering deeper slabs. Sluffs are usually easy to deal with but slabs are definitely not.

SNOW IMMERSION SUFFOCATION (SIS HAZARDS)

Skiing and snowboarding off the groomed runs and in deep powder is one of the most exciting and appealing parts of our sport. However, if you decide to leave the groomed trails, you are voluntarily accepting the risk of a deep snow immersion accident. A deep snow or tree well immersion accident occurs when a skier or rider falls into an area of deep unconsolidated snow and becomes immobilized and suffocates. Deaths resulting from these kinds of accidents are referred to as an SIS hazard or Snow Immersion Suffocation.