Mount Jumbo Avalanche Accident
February 28, 2014
Missoula, Montana
City of Missoula Conservation District Land (Open Space Lands)

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SYNOPSIS

On February 28, 2014 at approximately 1615 hrs, a snowboarder triggered a hard slab avalanche on a west facing, 35 degree slope of Mount Jumbo, located within the Missoula City limits on Missoula Conservation District land.

The snowboarder was caught by the avalanche but able to self arrest by digging in with the edge of his board and using his arms and fingers to grab the bed surface as the snow passed by.

The avalanche entrained most of the available snow in the fetch zone and accelerated as it advanced over a terrain convexity halfway down the track.

At the base of the ravine, the avalanche caught two children, Phoenix and Coral Scoles-Coburn, ages 8 and 10, who were playing in their backyard as it slammed into and destroyed a two story wood frame home. The two residents of the home, Fred Allendorf, 66, and his wife Michel Colville, 68, were inside the house when it was hit.

The two children saw and heard the avalanche coming down the ravine and ran downslope toward their home. Both were caught and carried several feet before coming to rest next to their home. Coral was partially buried, up to her armpits, and was able to dig herself out quickly. Phoenix was completely buried next to the house about 3 feet deep.

Fred and Michel were together in their home and were also completely buried under several feet of snow and debris from their destroyed home.

At 1618, Missoula City Fire, Police, Missoula County Sheriff, MT Highway Patrol units and local EMS teams were dispatched. A large contingent of well equipped neighbors with avalanche rescue gear soon began arriving on scene.

Rescue coordination was complicated by live power lines, broken natural gas lines and the very real possibility of another avalanche. The crown was not

visible from the valley floor due to the mid-slope convexity and extreme weather that blocked visibility.

Spot probing began and a probe line formed near the home just below Phoenix's last seen point. Phoenix described being in the dark and unable to move his arms after being buried. He stated that he tried eating and chewing away at the snow until he became so tired that he fell asleep.

He was located 3-4 feet deep by a probe strike after approximately 55 minutes at 1709 hrs. When extricated from the snow, he was unresponsive. Rescue breaths were given and he was immediately transported by ground ambulance to Saint Patrick Hospital's Emergency Department.

Rescue efforts then concentrated on spot probing and digging in areas directly below the last known location of Allendorf and Colville. A neighbor showed rescue teams the probable location on the remaining foundation of where the couple may have been on a Friday afternoon.

Probe teams were directed to concentrate on possible catchment features on the fall line below this area of the house. A probe strike was confirmed and Allendorf was located at 1758 hrs in a cavity under a brick chimney and a wall or roof partition approximately 4 feet deep. He was responsive and able to inform rescuers that his wife was 3 feet from him when the house was hit.

He was extricated and transported by ground ambulance to Saint Patrick Hospital's Emergency Department.

At 1907 hrs, Colville was located by a responding neighbor with a probe. An earlier probe detected a soft spot where a sofa was removed. This location was re-probed after a few minutes and a probe strike confirmed as Colville. She was approximately 25 feet below her husbands location 2-3 feet deep.

Colville was breathing but unresponsive. Extricated at 1914 hrs, she was transported to Saint Patrick Hospital's Emergency Department in critical condition. She died on March 3 from traumatic injuries.

Three other homes, several vehicles and an apartment building were also damaged by the avalanche.

Avalanche Classification: HS-ARu-D3.5-R4-S,O

Description:
HS: A hard slab avalanche.
ARu: Triggered unintentionally by a snowboarder.
D3.5: The destructive force (D) destroyed a house, several cars and damaged several other structures.
R4: The avalanche was large but did not involve the maximum area.
S,O: A surface wind slab initially released at the recent storm snow interface and stepped down to the ice crust at ground level.

Avalanche dimensions

Coordinates: N 46.8739 X W -113.9639 (mid-crown)
Aspect: 294 degrees
Crown elevation: 4480 feet
Terminus: 3280 feet
Vertical drop: 1170 feet
Crown width: 658 feet
Depth: 2.5 feet, Max: 4 feet
Average depth: 3 feet
Slope steepness at crown: 38+ degrees
Average: 35
Distance from crown to terminus: 2200 feet
Average slope steepness: 35 degrees
Maximum steepness at convexity: Estimated at 40 degrees
Alpha Angle at terminus: 30 degrees

Weather and Snowpack

Near record snowfall amounts were recorded in the Missoula Valley during the week before the avalanche. On February 24 and 25, skies cleared and temperatures moderated.

Temperatures above freezing and several hours of sun melted down most of the mountain's snow which then froze hard as temperatures plummeted with the arrival of an arctic air mass.

A rare blizzard warning was issued for Missoula with several inches of snow and high east winds forecast for the area. By the afternoon of February 28, the area received several inches of snow and strong east winds loaded fetch zones high on the mountain. Turbulent winds also heavily cross loaded the ravines

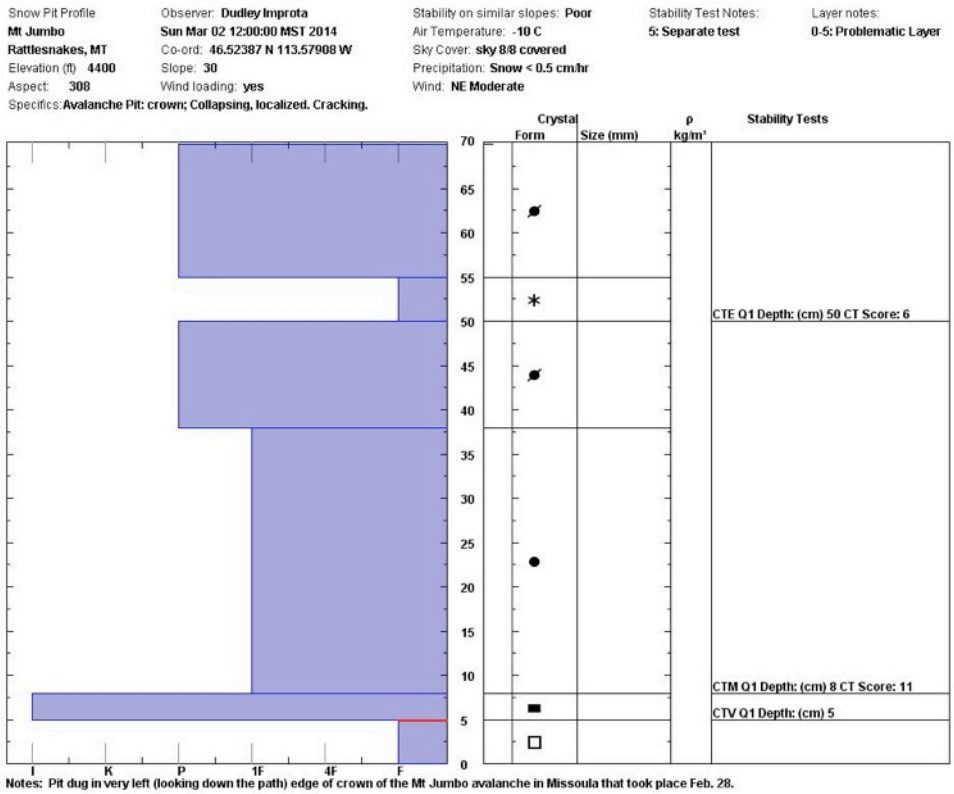
leading to the valley floor. The high wind formed sensitive wind slabs on what under normal conditions is a wind scoured slope.

Mount Jumbo Google Earth View
Red lines approximate avalanche crown and path

On Sunday, March 2, avalanche specialists Dudley Improta and David Williams, from the West Central Montana Avalanche Center in Missoula were given special permission to enter the Mount Jumbo closure area to conduct a stability assessment of the avalanche path and adjacent terrain.

As they travelled to the site, they reported localized collapsing, whoompfing and fracture propagations in pockets of wind drifted snow. They were careful not to cross any snowfield that connected to steeper terrain. They were able to walk on bare ground for much of their tour.

At the crown, they found a weak snow structure (see profile) with a pencil hard wind slab overlying a fist hard layer of cold snow sandwiched between the hard surface layer and a pencil to 1 finger hard slab on top of the ice layer that formed during the sunny warm days earlier in the week. Large facets were at ground level.



Snow Pit Profile (crown profile) March 2, 2014

We have not yet interviewed the individual who was involved and will post more detailed information about his experience later. Considering the crown profile and other observations made by Improta and Williams, we believe the snow initially failed on the pencil hard wind slab then stepped down to involve the remaining slab to the ground facets/ice layer.

A complete report will be posted once the Missoula Police Department releases their findings and key witnesses have been interviewed by avalanche center personnel. This is a complex accident investigation involving multiple agencies and witnesses.

The American Avalanche Association's Avalanche Accident Report Long Form will be submitted to the National Avalanche Center and Colorado Avalanche Information Center once our findings are complete. Please direct any questions to info@missoulaavalanche.org.

View of the crown looking north on March 2

View of the starting zone and upper ½ of the path

Looking downslope from the foundation of the destroyed home

Terminus of the path at the Intersection of Holly and Van Buren

Dudley Improta conducting crown profile on March 2