

Kendall Peak Avalanche Fatality

December 19th, 2015

Report prepared by Dennis D'Amico

Incident snapshot

(All fields estimated or unknown outside of victim's recovery)

Date: December 19th, 2015 (date last seen and reported missing)

Location: Kendall Peak, Commonwealth Basin, King Co., Mt Baker-Snoqualmie NF, Washington State

Number caught: 1

Number killed: 1

Avalanche safety gear carried: Transceiver, shovel, probe, Avalung pack

Avalanche Training and Experience: Victim had some formal avalanche training (AIARE Level 1) and was very familiar with the NWAC avalanche forecast and area weather stations.

NWAC Forecast Zone: Snoqualmie Pass

Avalanche Danger Rating (above tree-line): Considerable

Victim recovery details provided by Seattle Mountain Rescue (SMR)

Date Recovered: June 4th, 2016

Lat/Lon: 47.43950, -121.38410

Elevation: near 5300 ft (above Pacific Crest Trail)

Slope Angle: estimated around 40 degrees

Slope Aspect: WSW (~240 deg)

Avalanche Terrain: Yes

Body Position/Gear: Head downhill, face down. Skis on skis, skis/boots near body, and Avalung pack next to body with the mouthpiece visible. Snow had melted out where the victim was found. Relative to the body, ski poles were found roughly 40-50 feet uphill and a few personal items were further downhill.

Extent of Injuries or Cause of Death (obtained from NWAC Interview with victim's partner):

Compressional asphyxiation is listed as the cause of death on the King County Coroner's report. Also on the report, contusions suggesting potential non-lethal blunt force trauma were found on the victim's left arm and both legs.

NWAC Comments

The terrain in which the victim was found, his body position, the report of contusions suggesting potential non-lethal blunt force trauma, and human and natural avalanches in the immediate and surrounding terrain all support the likelihood of an avalanche fatality.

Initially, the collective assumption, including at NWAC, was that the victim died because of asphyxiation due to deep snow immersion (also known as snow immersion suffocation or SIS). A deep snow immersion death occurred across the highway at the Silver Fir area of the Summit at Snoqualmie ski area on the same day. That assumption migrated to a probable avalanche fatality after the victim was recovered in early June and subsequent meetings with SAR personnel revealed the victim's location. However, we cannot rule out the possibility that a tree well played a role in the victim's death as both tree and rock wells were reported as hazards that day by backcountry travelers.

We want to acknowledge the tremendous search and rescue effort (nearly 3000 man hours) and the greater community effort which resulted in the recovery and much of the information in this report. Due to the circumstances of this incident, we will never know exactly what happened on December 19th. We will do our best to distill the information from multiple interviews of parties in the Kendall Peak vicinity that day by avoiding speculation and focusing on the snow conditions they experienced and the details of the human triggered avalanches in the immediate vicinity of the location in which the victim was recovered. Our goal with this report is to provide an objective and factual accounting of what is known, and to offer some potential learning outcomes to an otherwise tragic event.

Weather and Snow Observations

The fatality occurred during the front end of a potent storm cycle for the Pacific Northwest that would break records in the Snoqualmie Pass area for both the snowiest week and snowiest December on record (records courtesy WSDOT). The cumulative effect of several storms with little break made for deep unsettled powder below treeline and difficult trail breaking.

Avalanche activity around this time was storm-snow related with new storm or wind slabs averaging around 30 cm (1 ft) Friday and Saturday across several reports by backcountry travelers in the Alpentel valley and Alpentel pro-patrol. One supporting public observation submitted to NWAC from a professional guide is included in this report. The intense storm cycle would complicate search and rescue efforts in the hours and days after the victim was reported missing as the snow continued to pile up.

Snoqualmie Pass Weather and Snow Data

	24 hr Precipitation (inches) ending at 4 am	24 hr Snowfall (inches) ending at 6 am*	Total Snowdepth (inches) at 6 am*
12/17/15	0.06	1.6	35
12/18/15	1.30	18.9	51
12/19/15	1.33	11.4	59
12/20/15	0.57	6.3	61

*manual DOT measurements taken at 6 am are more accurate than the automated telemetry for 24 hr snowdepth

Plausible Avalanche Fatality Scenarios (Not ranked by likelihood of occurrence)

1. The victim was killed by an avalanche triggered by another party.
2. The victim was killed by an avalanche he triggered.
3. The victim was killed by a natural avalanche.

Why are the following interview summaries and related photos included in this incident report?

1. The interview summaries provide direct observations of the snow stability and of human triggered avalanches in the immediate area that the victim was recovered.
2. They provide a possible temporal and spatial connection between the victim and observed human triggered avalanches. Their inclusion does not mean avalanche fatality scenario #1 is the most likely, nor does it mean that avalanche fatality scenario #1 is limited to one party as there were other parties touring in the area that day.

Party A Interview Summary, (paraphrased by NWAC)

Party A consisted of two skiers.

Party A tried twice to gain the ridgeline, retreating both times as they were concerned about potentially decreasing snow stability/avalanche consequences as they moved higher in the terrain. The first two runs in the glades skied great.

For their last run they decided to gain the ridgeline (Photo 1). Party A had observed several other parties in the Kendall area that day, and observed Party B following their skin track up toward their position on the ridgeline. Once Party A decided that Party B was not in a potential avalanche path of their ski line the first member of Party A descended, ski cutting the top of the slope and triggering a soft and shallow wind or storm slab avalanche. He was not caught or carried, and skied partway down the slope pulling off to the side. The 2nd skier of Party A then triggered one of two small subsequent avalanches from the remaining hang fire. Hang fire hit the first skier of Party A downslope, and he was knocked down and carried about 20 feet. He was not injured.

Party A does not believe the initial slab avalanche ran very far, but neither Party A nor B observed the full vertical extent of the avalanche as the runout was out of sight. Also, neither party performed a transceiver search.

Both Party A and Party B noted that although the avalanche broke off as a slab, the debris was quite soft and devoid of obvious blocks of a larger, harder snow avalanche.

Party B Interview Summary (paraphrased by NWAC)

Party B consisted of two skiers and a dog.

Great powder skiing the first couple of runs on the lower west facing slopes of Kendall Peak and the snow was quite deep. No sluffs were noted but a bit of a cohesive slab was observed near tree-line in initial runs, but not sensitive to ski triggering.

As Party B skied later in the day, they believe they passed the victim on the lower skin track (below treeline) between 12:45 PM and 1 PM.

As they ascended the skin track of Party A, they saw Party A near the top of ridge. Before Party A descended, there was no direct communication between the parties. Party B observed the avalanches that Party A triggered.

Party B estimates 30 minutes had elapsed between when they believe they saw the victim further downslope, perhaps 500 vertical feet below, and when the avalanche(s) triggered by Party A occurred. Again, the 1st avalanche involved the slope Party A ski cut, the 2nd and 3rd consisting of hang fire.

After Party A's descent, Party B ascended the ridge, waited until after 2 pm, and skied a chute further to the south or skier's left. They triggered a soft wind slab avalanche that easily propagated about 20 ft across but did not run very far downslope; the small avalanche stayed well within their line of sight. No one was caught and they skied down without incident.

Closing Thoughts

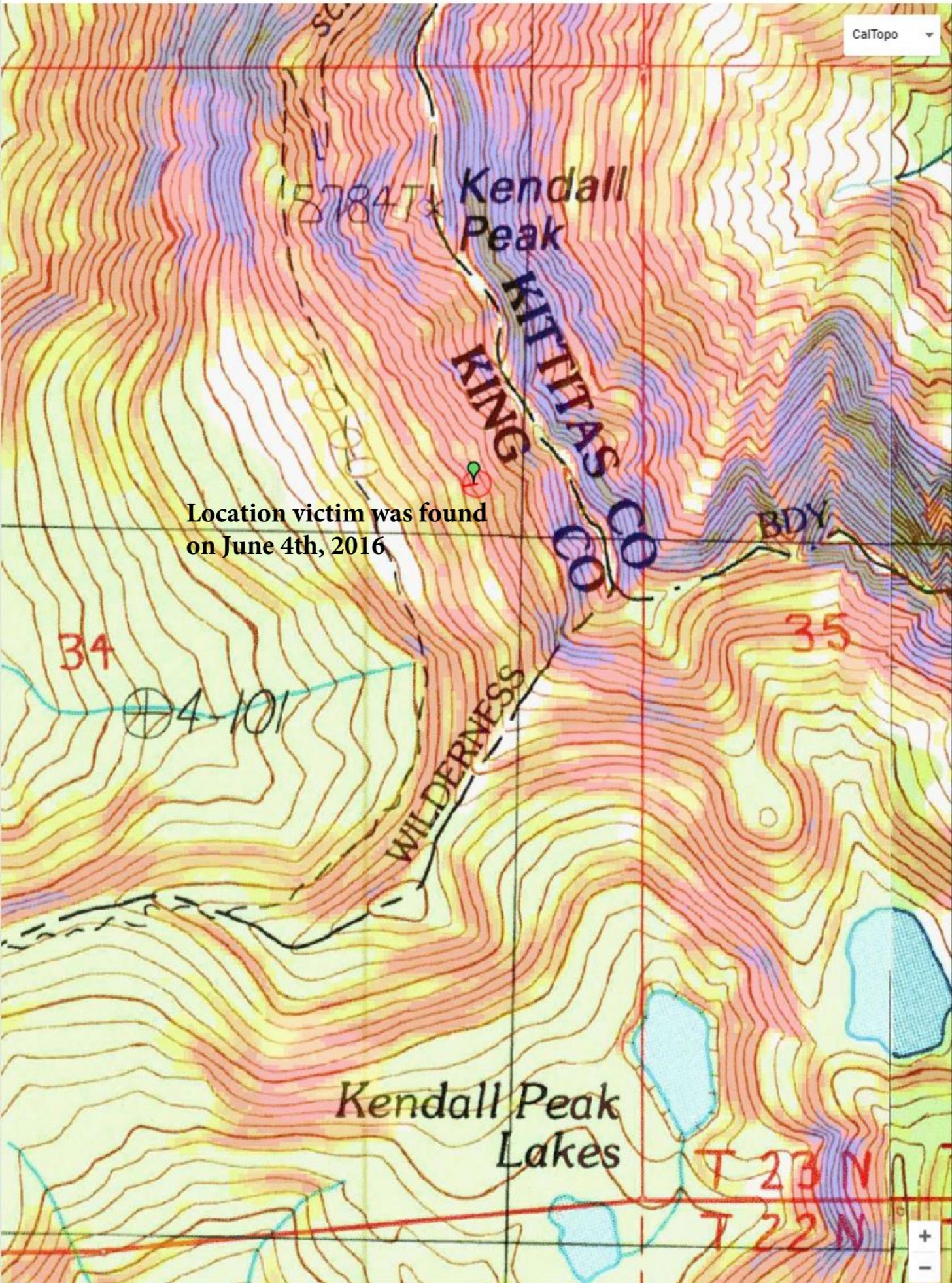
These broad closing thoughts are meant to further a more in-depth discussion within our community, one that should take place outside an incident report focused on the victim.

- This incident highlights the decreased margin for error associated with solo travel in avalanche terrain. In this case, a well-trained partner may have been able to provide immediate support.
- More than 3000 man hours were logged during the search, and several times the searchers were within close proximity to the victim. Carrying a cell phone, Recco, and/or other searchable device with a greater range than an avalanche transceiver may help rescuers in similar recovery situations.
 - In this particular incident SMR feels that had they been able to trace a cell phone signal the victim's location would have been pinpointed quickly and a vast initial search area would have been avoided.
 - The victim chose to not carry a cell phone on this particular tour because of terrain familiarity and the relative ease of access/proximity to I-90.
 - We want acknowledge the potential for signal interference between a cell phone and an avalanche transceiver in close proximity.
- While we cannot say whether or not human triggered avalanches hit and buried the victim, we can generalize by saying:
 - In the backcountry, we share responsibility for those above us and below us.
 - Along those lines, we may not be capable of effectively managing this responsibility in highly used areas on days with a sensitive snowpack.
 - This issue will continue to challenge our ability to safely travel in avalanche terrain in an increasingly crowded backcountry.

The Northwest Avalanche Center would like to specifically thank the individuals in Party A and B for their willingness to share and directly contribute to this report as well as the victim's partner for revisiting and sharing details of a tragic event.

NWAC would also like to especially thank and recognize Charlie Hagedorn for his extensive efforts and contributions to this report.

Location: 47.4395, -121.384, Elevation: 5287 ft, Slope: 36 degrees
weather.gov peakfinder.org



Location victim was found on June 4th, 2016



Location victim was found on June 4th, 2016



Photo 1



Flank of skier triggered avalanche by Party A
December, 19th 2015

Photo 2



Party A ascending the ridge. Part of the slope in this picture slid during a ski cut performed by Party A. Following the first avalanche, two instances of hang fire were triggered, including one that caught and briefly carried a skier in Party A.

December, 19th 2015

Photo 3



● Represents area victim was recovered on June 4th, 2016

Photo 4 by Charlie Hagedorn



Annotations represents area victim and poles were recovered on June 4th, 2016

Photo 5 by Charlie Hagedorn taken on Oct 1st 2016.

Crown faces of natural avalanches near Middle Kendall Lake observed around mid-day on December, 19th 2015



Photo 6 (above) and Photo 7 (below) by Charlie Hagedorn



Recreational Observation

Skinned up the climber's left side of the Alpental Valley to the base of Draft Dodger ridge at 4500 feet (via big trees)

Dec. 19, 2015, 1 p.m. PST

Weather: Overcast skies, calm winds, air temps -3 C

Snowpack: HS between 200 - 26 cm at 4500

Area Description: Alpental Valley above Source Lake - Draft Dodger Ridge

Avalanches: AIARE 2 class observed multiple (4-6) natural avalanches, estimated from 12/18 and early 12/19, storm slabs sizes 1-2 on N, NE, E aspects in steep terrain. We also observed two larger and older (from late 12/17 or early 12/18) crowns and debris piles on the easterly slopes below the tooth, estimated size 2 - 3

Observation by Margaret Wheeler

Latitude: 47.467197

Longitude: -121.468191

Did you see any avalanches? Yes

Did you trigger any avalanches? No

Was anyone caught in an Avalanche? No

Snoqualmie Pass

Issued: 6:00 PM PST Friday, December 18, 2015 by Kenny Kramer

NWAC avalanche forecasts apply to backcountry avalanche terrain in the Olympics, Washington Cascades and Mt Hood area. These forecasts do not apply to developed ski areas, avalanche terrain affecting highways and higher terrain on the volcanic peaks above the Cascade crest level.

The Bottom Line: Dangerous avalanche conditions should persist Saturday, though be improving. Best to be particularly cautious, especially near and above treeline, avoiding steep or wind loaded slopes, watching for sensitive storm layers and wind slab deposits.

Issued: 6:00 PM PST Friday, December 18, 2015 by Kenny Kramer

Elevation

Saturday

Outlook for Sunday



Above Treeline



Considerable

Dangerous avalanche conditions. Careful snowpack evaluation, cautious route-finding and conservative decision-making essential.



Considerable



Near Treeline



Moderate

Heightened avalanche conditions on specific terrain features. Evaluate snow and terrain carefully; identify problem features.



Moderate



Below Treeline



Moderate

Heightened avalanche conditions on specific terrain features. Evaluate snow and terrain carefully; identify problem features.



Moderate

Danger Scale

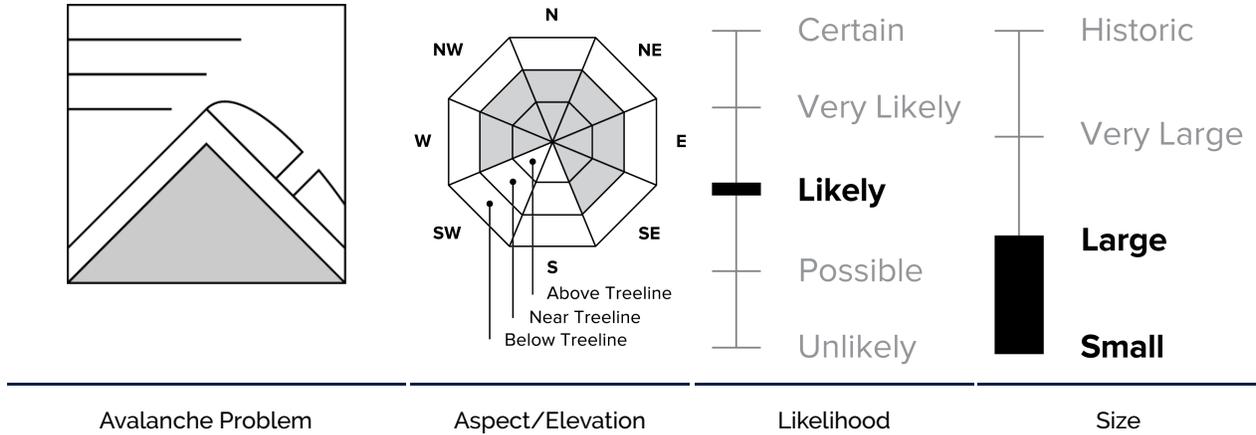


Issued: 6:00 PM PST Friday, December 18, 2015 by Kenny Kramer

Avalanche Problems for Saturday

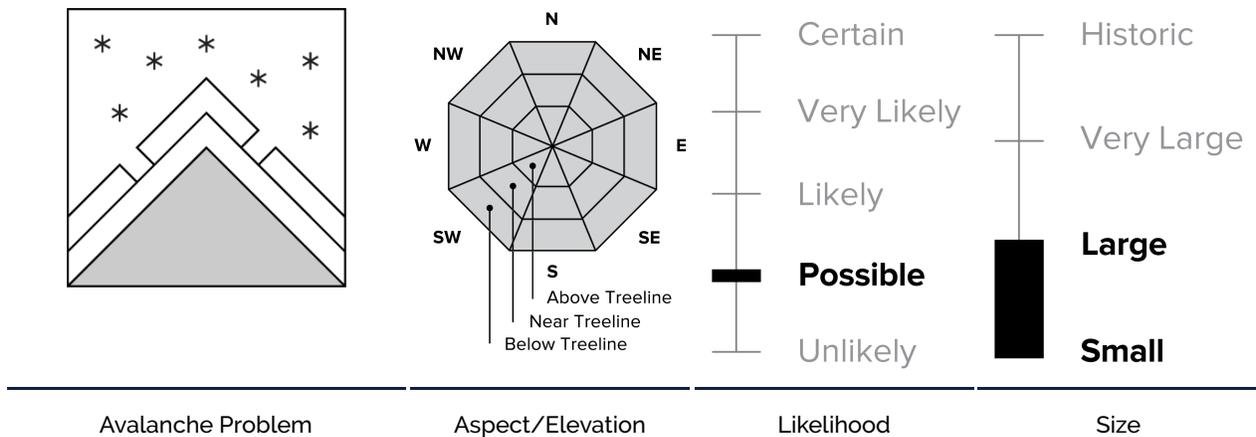
Wind Slab

Wind slabs can take up to a week to stabilize. They are confined to lee and cross-loaded terrain features and can be avoided by sticking to sheltered or wind scoured areas.



Storm Slabs

Storm slabs usually stabilize within a few days, and release at or below the trigger point. They exist throughout the terrain, and can be avoided by waiting for the storm snow to stabilize.



Snowpack Analysis:

A series of cool storms over the past 10 days following the December 7-8 major rain event, have deposited increasing storm snow at relatively low freezing levels.

The dominant avalanche problems currently remain from storm slabs and wind slabs. Periods of heavy snowfall Thursday and early Friday quickly built unstable storm snow conditions, especially in the Snoqualmie and Stevens Pass area, both Thursday and Friday. Strong winds also built wind slab layers on a variety of aspects due to terrain channeling and redirecting local winds.

These storm and wind slab problems caused extensive avalanches, both natural and triggered. The great majority of the reported recent soft slab avalanches have released on storm snow interfaces mainly in the upper 8-12 inches of snow. In the Snoqualmie Pass area a brief freezing rain crust was deposited Thursday morning and many slides have released to this layer. A few larger slides up to 2 feet were seen with larger explosives at Alpental Friday, mainly initiating in recent layers and breaking to older storm snow layers. No slides have been reported releasing to the December 9 crust interface which remains strongly bonded.

The Cascade pass areas were protected from the warm up Thursday afternoon by cool east flow and this maintained precipitation as snowfall to the valley bottoms. However, other areas experienced a warm up and rain up to about 6200 feet in the Crystal and Paradise area, lower in the north and to near or above 7000 feet in the south. This is forming a new crust layer with shallower storm snow above.

There was a party of two caught and injured in the Alpental Valley Thursday near midday at the height of the increased storm slab instabilities. Fortunately, no major injuries or worse occurred.

A good time to review just what the North American Public Avalanche Danger Scale definitions are during CONSIDERABLE danger, especially during a noted increasing danger trend.

Detailed Forecast for Saturday:

A transitory ridge of high pressure should move across the area Saturday to allow for cool weather, light winds and some possible sun breaks. This weather should allow for a slow improving trend as recent storm and wind slab slowly settle and strengthen.

Avoid terrain where wind may have built isolated wind slab layers, mainly higher elevations near ridges, most likely on a wide variety of aspects..

Avalanche problems Saturday should continue to be associated with recent storm and wind slab layers. Avalanches should be confined to the new storm snow since Thursday, but a few may step down to older storm layers or crusts in isolated locations.

Terrain anchors are still causing significant anchoring at the lowest elevations. Use caution near creeks which are still open in some areas.



**American Avalanche Association
Forest Service National Avalanche Center
Avalanche Incident Report: Short Form**



Occurrence Date (YYYYMMDD): 20161219 and Time (HHMM): 0

Comments: All fields are either estimated or unknown. We believe it is probable this is an avalanche fatality based on the victim's recovery location in avalanche terrain and other supporting factors. The victim was recovered almost 6 months after he was first reported missing.

Reporting Party Name and Address: Dennis D'Amico
Northwest Avalanche Center
7600 Sandpoint Way NE
Bld 1
Seattle, WA 98103

Avalanche Characteristics:

Type: Aspect:
Trigger: Slope Angle:
Size: R \ D Elevation: m / ft
Sliding surface (check one):
 In new New/old In old Ground

Location:

State: WA County: King Forest: Mount Baker-Snoqualmie NF
Peak, Mtn Pass, or Drainage: Commonwealth Basin, Kendall Peak
Site Name:
Lat/Lon or UTM: 47.4395, -121.3841

Group	Number of People	Time recovered	Duration of burial	Depth to Face <input type="checkbox"/> m / <input type="checkbox"/> ft
Caught	1			
Partially Buried— Not critical				
Partially Buried-- Critical				
Completely Buried				
Number of people injured:		Number of people killed: 1		

Dimensions <input type="checkbox"/> m / <input type="checkbox"/> ft	Average	Maximum	
	Height of Crown Face		
Width of Fracture			
Vertical Fall			
Snow	Hardness	Grain Type	Grain Size (mm)
Slab			
Weak Layer			
Bed Surface			
Thickness of weak layer:		<input type="checkbox"/> mm / <input type="checkbox"/> cm / <input type="checkbox"/> in	

Burial involved a terrain trap? no yes → type:

Number of people that crossed start zone before the avalanche:

Location of group in relation to start zone during avalanche: high middle low below all unknown

Avalanche occurred during ascent descent

Subject	Name	Age	Gender	Address	Phone	Activity
1	Montague "Monty" Busbee	43	M			Backcountry Skiing
2						
3						
4						
5						

Equipment Carried

1	2	3	4	5	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Transceiver
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Shovel
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Probe
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Experience at Activity

1	2	3	4	5	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Unknown
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Novice
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Intermediate
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Advanced
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Expert

Avalanche Training

1	2	3	4	5	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Unknown
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	None
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Some
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Advanced
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Expert

Signs of Instability Noted by Group

- Unknown
- None
- Recent avalanches
- Shooting cracks
- Collapse or whumping
- Low test scores

Injuries Sustained

	1	2	3	4	5	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	None
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	First Aid
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Doctor's care
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hospital Stay
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fatal

Extent of Injuries or Cause of Death

	1	2	3	4	5	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Asphyxiation
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Head Trauma
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Spinal Injury
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chest Trauma
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Skeletal Fractures
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other: Contusions suggesting non-lethal blunt force trauma were found on the victim's left arm and both legs. No fractures were identified in these areas.

Damage Number of Vehicles Caught: Number Structures Destroyed: Estimated Loss: \$

Accident Summary Include: events leading to accident, group's familiarity with location, objectives, route, hazard evaluation, etc. Please see full NWAC incident summary for details

Rescue Summary Include: description of initial search, report of accident, organized rescue, etc.

After almost 3000 searcher hours from several organizations spanning close to 6 months, the victim was located and subsequently recovered on June, 4th 2016. Please see the NWAC report for more details. NWAC interviewed the victim's girlfriend regarding the King County Coroner's report. This was not included in the Equipment Carried, but the victim's Avalung Pack was found next to his body and the mouthpiece was visible.

Rescue Method

	1	2	3	4	5	
	<input type="checkbox"/>	Self rescue				
	<input type="checkbox"/>	Transceiver				
	<input type="checkbox"/>	Spot probe				
	<input type="checkbox"/>	Probe line				
	<input type="checkbox"/>	Rescue dog				
	<input type="checkbox"/>	Voice				
	<input type="checkbox"/>	Object				
	<input type="checkbox"/>	Digging				
	<input type="checkbox"/>	Other:				

Attach additional pages as needed. Include weather history, snow profiles, reports from other agencies, diagram of site, photographs, and any other supporting information

Please send to: CAIC; 325 Broadway WS1; Boulder CO 80305; caic@state.co.us and to the nearest Avalanche Center.