Date: 2010-12-29
Submitted By: West Central Montana Avalanche Center
Place: Rattlesnake Wilderness 1 air mile NE of MT Snowbowl Ski Area
State: MT
Country: USA
Fatalities: 0
Summary: 2 skiers caught and partially buried in 2 separate avalanches while skinning.

*** FULL REPORT FROM THE WCMAC ***

View report and photos online at: www.missoulaavalanche.org

SYNOPSIS:

On Wednesday December 29th, 2010, 2 backcountry skiers were caught in 2 separate avalanches triggered while they skinned back to a ridgeline after skiing a popular backcountry area called 3 Tier near the Montana Snowbowl ski resort. Both skiers lost some gear and one sustained head lacerations that required stitches. No other injuries were reported and both were able to return to the ski area under their own power after several hours of post-holing up the ridge to Point Six where they made physical contact with members of the Snowbowl Ski Patrol at the Snowbowl boundary.

EVENTS LEADING UP TO THE ACCIDENT:

Skiers A and B left the ski resort boundary around noon and climbed to Point Six to access the ridgeline that leads to the avalanche site. Although snowing heavily with high west winds the skiers did not witness any signs of avalanche activity or experience collapse or whoomping of the snowpack while gaining access to the site. They read or listened to the avalanche advisory issued on Monday 12/27/10 and were aware of the buried weak layers that formed earlier in the month which was the primary concern addressed in that advisory.

They dug 2 pits on an aspect similar to the run they planned to ski, got mixed results but felt OK with skiing the slope after seeing stronger stability scores in the second pit. They skied the line skiers left of 3 Tier proper (Taint) and began putting in the skin track back to the ridge.

They were unaware of the Avalanche Warning the center issued at 1200 on the 29th for HIGH avalanche hazard specific to the Rattlesnake Mountains due to the heavy new snow and wind. The Stuart Peak SNOTEL received close to 2 inches of snow water equivalent (SWE) from 12/27 to 12/29. Snowbowl Ski Area reported 15 inches of new snow on 12/29. By 12/30, 4 inches of SWE (30-35 inches of snow) was reported at Stuart Peak.

AVALANCHE:

At approximately 1315, the first avalanche was triggered and caught skier A. He was overtaken by the slide, pushed into and pinned against a tree. He was partially buried and needed assistance from skier B who helped extricate him from his position. He lost both ski poles in this avalanche.

Recognizing that conditions were not what they assessed earlier, they decided to continue skinning back to the ridge but on a traverse that put them deeper into the trees and lower than the usual and well used skin-track traverse out of this area.

At approximately 1330 a second and larger avalanche pulled out of the open slope above the two skiers, moved through the trees and caught both skiers. Initially skier A grabbed a tree but was pushed over by the force of the slide and moved 30 yards down-slope without hitting any trees. Skier B was caught and strained through small trees. Both were partially buried but able to fully extricate themselves on their own. Skier B sustained a head laceration that was bleeding seriously but was quickly brought under control. This wound along with a smaller cut on his chin later required more than 20 stitches to close. He remained conscious throughout the entire event.

Skier A lost a ski and skier B lost poles in the second avalanche.

With both skiers having lost important equipment they began the long trek back to the ski area via the ridge that connects with Point Six and eventually Snowbowl. They contacted 9-1-1 at approximately 1530 once they were high enough to gain a cellular connection. They remained in contact with the ski patrol at Snowbowl until they reached the area boundary at approximately 1900.

The coordinates for the accident are: 47. 037N, 113.978W

These were soft slab avalanches that released on a bed surface of surface hoar and small-grained facets that formed during clear weather the first week of December. The avalanche was on a 7200' NE aspect, the crown was 2 - 2.5 feet deep and 200-300 feet across. Distance from the crown to the toe of the debris field is approximately 500 feet with a drop of 200 vertical feet. Average slope steepness is 30 degrees with a mid-slope convexity that approaches 40 degrees. Slope steepness at the crown averages 35-38 degrees.

The classification for this avalanche is: SS-AF-R3-D2-O.

The avalanche advisory posted by the West Central Montana Avalanche Center (WCMAC) on 12/27/10 gave a moderate rating for all slopes above 5000 feet and mentioned that the avalanche danger would increase with new snow and wind. On 12/29/10 at 1200hrs the Avalanche Center issued an Avalanche Warning specific to the Rattlesnake Mountains north of Missoula. This warning was based on the intensity of the storm winds and high SWE in 24 hours. An Avalanche Warning for the entire advisory area was issued on 12/30/10.

SEARCH AND RESCUE:

Both skiers were able to return to the ski area under their own power though conditions worsened during the return trip. Missoula County Search and Rescue was notified and the Professional Ski Patrol at Snowbowl was ready to provide assistance should the pair become disabled.

Travel conditions were very poor with high winds and steady heavy snowfall. They reported whoomping and collapsing of the snow while they returned to the ski area and an exhaustive hike because of the loss of a ski and poles.

Two members of the Ski Patrol traveled to the Point Six summit with food and water and were able to meet the skiers there and assist them back to the warming hut at the top of Snowbowl. After given the chance to rest and warm up, Ski Patrollers brought them to the Snowbowl base area via snowmobile.

WEATHER & SNOWPACK:

Western Montana weather has been influenced by a relatively strong La Nina this winter with strong wet Pacific weather systems delivering heavy dense snow to elevations above 5000 feet. This early season snow formed a strong basal layer that poses no stability issues unlike the conditions experienced in the 2009 and 2010 winters. Portions of our area experienced episodes of surface hoar growth in early December on or near the 2nd and then again on the 12th. These two layers became stability concerns once buried and persisted through this most recent avalanche cycle on 12/29. The more deeply buried layer appears to be the culprit in this avalanche and has shown consistent ability to propagate fractures in stability testing throughout the advisory area. The upper layer of BSH and near surface facets appears to have been affected by moderate temperatures, wind and sun immediately after formation so is much stronger than the layer that formed on December 2nd.

Stability tests performed on the flank of the avalanche confirmed that the snowpack failed on the deeply buried surface hoar layer. Compression and extended column tests showed very easy failure with clean propagation at 75cm in a 200cm total snowpack. CTE3 Q1 and ECTP3 Q1 adjacent to the avalanche site. Many natural avalanches were observed on all aspects on 12/30 with many of these running farther than experienced in previous years.

CONCLUSION:

Assessing stability of a buried surface hoar layer(s) can be one of the more difficult decisions backcountry users, as well as professional avalanche forecasters, face when making a snow stability evaluation. They can be difficult to see in a snow pit and can persist for weeks and months after they are buried. Sometimes stability tests can give a false sense of security if other factors are not taken into consideration such as ability of a slab to propagate over distance, the quality of the failure plane, terrain features, etc.

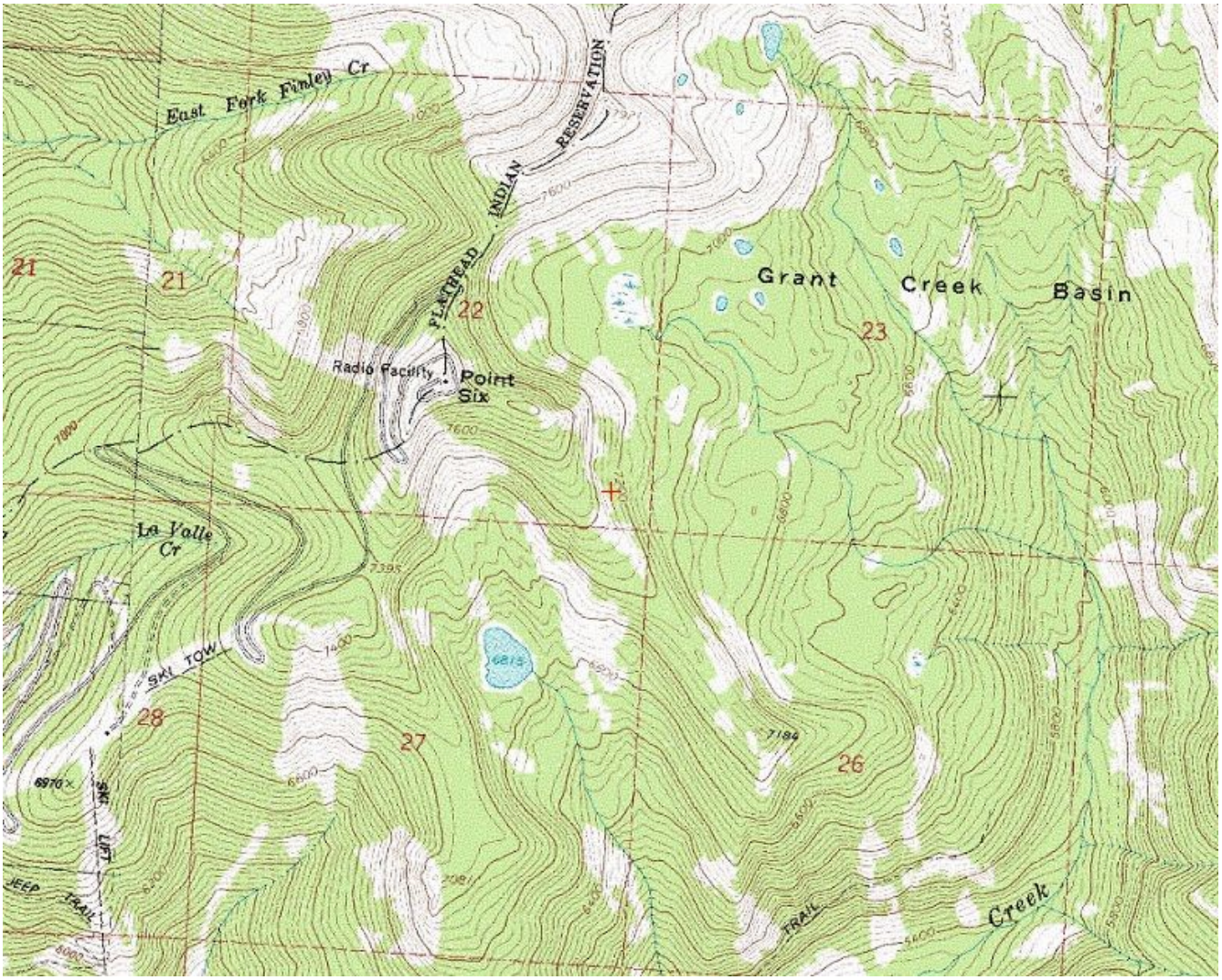
The very nature of surface hoar, how and where it forms, the ease of it to be destroyed and the length of time it can persist once buried complicates assessments. We have found locations in several of our outings this year where we find perfectly stable conditions only to dig a pit 100 feet away or maybe just a slight aspect change and find very unstable conditions.

This situation certainly came into play in this incident.

Another factor that both individuals were concerned about is the location of skin-tracks and the ease of becoming complacent about the safety of their location after being used many times without incident. Skin-tracks are being set in locations that are exposed to avalanches simply because it is the shortest way out or offers little resistance in the way of navigating through forested sites.

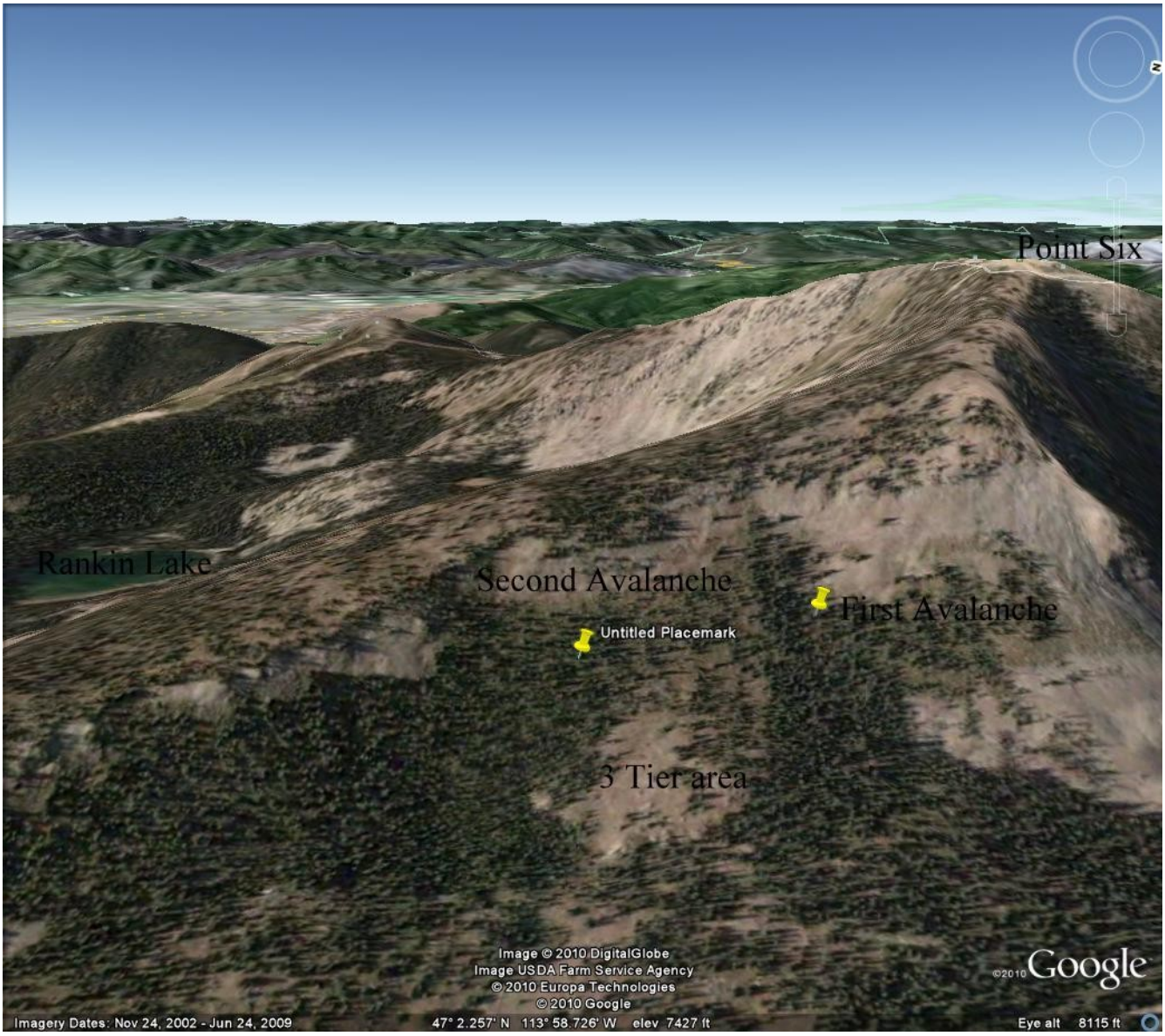
The route this group took after the first avalanche placed them in an area below the normal skin track in smaller trees where they felt safer. Under the conditions present that day, they triggered an avalanche

from below that easily flushed through the trees and reached them even though they believed it was a safer choice. As it turns out, it was. Had they been on the usual skin-track, they may not be alive today.



Topographic map of the general area.
Avalanche site is map center

Air photo of site



Google Earth Looking West