RESCUE SUMMARY

While a call went out to the Whatcom County Search and Rescue, other snowmobilers, some of whom had beacons and probes, responded right away. They found the victim's snowmobile and helmet fairly quickly, but not the victim himself. The debris was blocky, hard slab debris.

Search and rescue personnel arrived after 13:00. By this time, about 30 snowmobilers had gathered, about half of whom had probes, beacons or shovels, but an organized probe search had not been performed.

The search and rescue crew organized a probe line, which found the victim at about 17:30, buried about four to six feet below the surface. They found the body directly downhill of the last seen point, about 150 feet uphill from his snowmobile.

AVALANCHE DATA

The avalanche released on a south-facing slope at an elevation of 6,600 feet and fell about 700 feet vertical. The crown was two to 2.5 feet deep and 1,500 feet wide. The slide was classified as HS-AMu-R3.

COMMENTS

Everyone in the group must have avalanche rescue equipment. But even then, not all victims will survive. In this avalanche, the debris was heavy and dense, the victim was buried fairly deeply, breathing would have been almost impossible, and lifespan would be measured in minutes.

STAIRS GULCH, SOUTHEAST OF SALT LAKE CITY, UTAH 20010428

April 28, 2001

Two climbers caught, buried, and killed

The following report was written by Bruce Tremper of the Utah Avalanche Center[2] and appears here with minimal editing.

SYNOPSIS

Martin Gleich (38), a doctor from Salt Lake City, and Scott Dull (39), also a doctor from Eagle River, Alaska were killed Saturday, April 28 in Stairs Gulch, a tributary of Big Cottonwood Canyon near Salt Lake City. The pair left the trailhead about 03:30 to 04:00 to climb Stairs Gulch to Twin Peaks with ice axes and crampons, rope and snowshoes but no beacons (they did not own beacons). They did not return by their 11:00 am planned return time and the Sheriff was notified that afternoon.

Inadequate rescue equipment

That evening, a Salt Lake County Search and Rescue team walked up both Stairs Gulch and the nearby Broad's Fork looking for the missing climbers. They discovered fresh avalanche debris in Stairs Gulch and quickly found Martin Gleich's boot sticking out of the snow about 100 yards above the toe of the debris at an elevation of about 6,400 feet. His head was buried about four feet deep and he had a couple of lacerations on his head. Medical examiners later determined he died by asphyxia. After finding Gleich's body, Wasatch Backcountry Rescue was called, which is a volunteer group composed of avalanche professionals from northern Utah ski areas. They responded with personnel

More than one person on a slope

from Snowbird (the only ski area open at that late date) along with a rescue dog. The avalanche dog easily located the second victim, Scott Dull, about a 10-minute hike above the first victim at an elevation around 6,900 feet. Although he was buried eight to 10 feet deep, part of his fleece shirt was torn to shreds and it stretched out about 10 feet with part of it on the surface, which may be why the dog was able to locate him so quickly. Scott Dull had multiple fractures and the medical examiner reported that he was killed by trauma. The accident appears to have occurred as the pair ascended.

RECENT WEATHER

The first half of April was very snowy. From the 3rd through the 9th, 50 inches of snow fell in the Wasatch Range, which caused one large dry avalanche to release in Stairs Gulch on April 8th and descend 5,000 vertical feet, stopping only 400 feet short of the Big Cottonwood Canyon road. Another 16 inches fell by the 14th and finally, another two feet fell in a storm ending on the 23rd, only five days before the accident. Then the weather warmed dramatically. The last overnight freeze of the snow surface occurred on Wednesday night, three days before the accident and even that freeze was quite thin and short-lived. For the next three days, daytime highs at automated weather stations the same elevation as the accident were in the 50s, rising to a high of 61 on Thursday the 26th. Minimum temperatures were 35 to 45 degrees and the night of the accident the minimum air temperature was 47 degrees, combined with scattered clouds and strong southwest winds. This was the warmest overnight low since September. Daytime highs in Salt Lake City were near 80 degrees for the few days before the accident.

At the Utah Avalanche Center, we usually end our regular morning advisories in mid April, but because of continued storms and then the subsequent wet slide activity, I had been issuing sporadic afternoon or evening updates as time allowed until the wet cycle abated. According to national policy, I did not use any danger ratings because of the limited information coming in so late in the season, plus, I was the only staff left working and my time allowed only limited and sporadic fieldwork. (The Salt Lake County Sheriff incorrectly reported to the media that the avalanche danger was rated as "moderate", but I had not been issuing avalanche danger ratings for the previous two weeks.) The advisory did, however, warn people about the warm temperatures, the lack of an overnight freeze and the presence of wet sluffs, wet slabs and other glide avalanches in the area. I suggested that if people still wanted to get out into the mountains that they get an early start and return early. No one knows whether Martin or Scott called the advisory before heading out, although Martin was a regular caller during the winter.

TERRAIN

Stairs Gulch is the steepest and longest avalanche path in the Wasatch Range near Salt Lake City. It has a vertical fall of about 5,000 feet and the upper section is composed almost entirely of 45 to 55 degree sloping rock slabs. Because it is such steep and large terrain, very few skiers or boarders ever enter Stairs Gulch in winter but climbers sometimes practice their alpine skills there in spring after the snow stabilizes. The route usually requires crampons and ice axes.

AVALANCHE CONDITIONS

On Sunday morning, the day after the accident, I ascended the ridge to the east of Stairs Gulch to look at the avalanche, since the route up the bottom of Stairs Gulch

Glide avalanche adjacent to the larger fatal glide avalanche. *Photo Bruce Tremper, UAC.*

was not safe because of continued very warm spring weather. I noticed that the steep rock slabs on the west side of the drainage had recently produced what appeared to be two large glide avalanches with several other smaller avalanches, and the snow that had not yet released had numerous glide cracks and appeared to be on the verge of releasing. While I was on the ridge I saw one smaller glide avalanche release and descend onto the debris and stop just above where the upper victim was recovered the previous night.

Glide avalanche

The avalanche that most likely caused the accident was a glide avalanche about 700 feet wide with a fracture depth averaging about five feet. These glide avalanches occurred on northeast-facing rock slabs of about 45 to 55 degrees. The crown was around 10,000 feet in elevation and the avalanche descended 3700 vertical feet to an elevation of 6,300 feet, running about a mile in length.

(The media, including local news, CNN and the Weather Channel, incorrectly reported the avalanche to be 30 feet deep and two miles wide—obviously hyperbolic numbers since 30 feet of snow has probably not existed in Utah since the Pleistocene and Stairs Gulch is less than a mile wide.)

On Thursday, two days before the accident, I skied up Broad's Fork, the next drainage to the east, and noticed three recent, large, glide avalanches off the steep rock slabs with one more on the steep rock slabs in Mill B South, the next drainage to the east.

Glide avalanches are relatively unusual for Utah, but they do occur regularly each spring on the steep rock slabs in radical terrain such as Stairs Gulch and Broad's Fork, usually in a time window of about two weeks after the dry snow turns wet for the first time of the season. They occur when percolating water lubricates the interface between the snow and ground causing the entire snowpack to slowly slide like a glacier on the underlying ground, often over the course of days, until it suddenly releases. They occur mostly in very steep rock slabs during very warm weather. You can easily

Debris from the Stairs Gulch avalanche of April 28, 2001. *Photo Bruce Tremper, Utah Avalanche Center.*

recognize them by gaping crevasses on their upper boundaries and a rumpled-up look on their lower boundaries. Glide avalanches are very difficult to trigger even with explosives—and like a stubborn mule, they tend to release only when they are ready, more or less randomly in time, kind of like a calving iceberg or icefall. Paradoxically, they show a slight preference to release during the coldest part of the day, or during a freeze following a protracted period of melting, which would fit the pattern of this avalanche. These were average sized avalanches for Stairs Gulch and are a regular occurrence each spring.

Statistically, glide avalanches kill very few people because 1) they are difficult to trigger, 2) the warm and soggy conditions that produce glide avalanches often discourage people from traveling on snow, and 3) most people instinctively avoid crossing beneath them, as they look quite dangerous even to people who don't know much about avalanches. This is the first known fatality from a glide avalanche in Utah and possibly the first in the United States.

HOW IT MAY HAVE HAPPENED

I doubt if the pair triggered the avalanche. First, glide avalanches are notoriously difficult to trigger. Second, the avalanche had a large amount of volume, much more than the volume produced by a wet, loose avalanche they may have triggered on their likely route. Plus, there was no obvious avalanche on their planned climbing route that could account for the volume of debris. Third, all of the glide avalanches I noticed the following morning were on rock slabs to the west side of their most likely route. The climbing route usually follows the gully the whole way since all other routes are quite steep and difficult, especially the routes that would have crossed the glide avalanches. Fourth, Martin's body was found near the toe of the debris, indicating that it may have come down on them from above.

The evidence indicates that the accident occurred early in the morning when the pair was on their way up. The evidence includes the following:

Richard Green, a local climber, ascended Broad's Fork the same day as the accident and climbed to the ridgeline separating Stairs Gulch from Broad's Fork. He then followed the same route the victims planned to use, following the ridge to Twin Peaks and returned along the same route, returning around noon. He said that he

did not see any tracks other than his own, indicating that the victims did not make it to the top of Stairs Gulch. Richard Green used an ice axe but no crampons. Alan Irdahl, one of the rescuers, flew in the helicopter the evening of the accident to look for the overdue victims. He saw these same tracks and assumed that they belonged to the victims.

On Friday, May 4th, the first day after the accident I felt was safe enough, I repeated their climb using crampons and an ice axe. After debriefing with their family members and friends at the burial site, I ascended Stairs Gulch alone to the summit ridgeline to take a closer look at their tracks. I did find what were probably Green's tracks at the top of Stairs Gulch that ascended to the ridgeline and also some nearby tracks that descended into Stairs Gulch. The tracks were in a place where a climber would naturally travel. The tracks were difficult to see since they had undergone several days of melting, then frozen by much colder weather, then buried by several inches new snow that had subsequently blown away. Only the top 200 feet remained visible since new snow and old wet sluffs covered up everything below that elevation. Complicating factors included one set of tracks that came from Broad's Fork and traversed into Stairs Gulch for awhile and returned again to the ridge, plus some mountain goat tracks that switch-backed up Stairs to the ridge. I spent about a half hour wandering around trying to sort it all out. As it turns out, Richard Green made the tracks along the ridgeline but did not make the tracks that ascended and descended into Stairs Gulch, so another party must have made them at another time. I believe that Gleich and Dull did not make it to the summit ridge but instead were caught as they ascended, mostly because of the following information:

Martin Gleich's sunglasses melted out of the debris nearly a month after the accident and they were still in their case, indicating that the accident occurred on the ascent, while it was still too dark to wear sunglasses.

Scott Dull's pack melted out of the debris a month after the accident and it appeared to contain an uneaten lunch. Martin's pack, recovered during the rescue, contained a couple of energy bars.

Martin Gleich carried a camera but he did not take any photographs; however, all his friends did not think this was conclusive since he almost never carried a camera nor took photographs. Plus, it was a rather cloudy day with very strong winds.

They did not use Martin's cell phone to call from the Summit, but there was no plan to do so. Scott's widow indicated that he often would call her on a cell phone when he got to the top of a ridge or mountain (he was an avid mountain runner), and she thought it was unusual for them not to call.

They were wearing crampons at the time of the accident and Martin had his ice axe strapped to his pack, indicating that they were not yet on steep terrain. They both were using their ski poles at the time of the accident. When they ascended they were walking on old avalanche debris from an avalanche on April 8th, and it probably would have been hard enough to warrant wearing crampons.

HUMAN FACTORS

Studies show that human factors are at least partially responsible for nearly 90 percent of avalanche accidents involving people with at least some avalanche experience and knowledge, and this accident also fits this pattern.

The time constraints on Scott Dull represent a large red flag. Scott and Martin were old friends. They had gone to medical school together and had climbed several moun-

tains together including Mt. Orizaba in Mexico (18,491 feet), Mt. Rainier several times, and Mt. Baker. They had taken a climbing school on Mt. Baker as well as an avalanche course. The pair was on a constrained time schedule as Scott and his wife flew into Salt Lake City just for the weekend specifically to visit Martin and his wife. The victims' widows were also close friends. They had first made the plans a couple weeks previous to the accident. Scott and his wife had flown in from Alaska the previous evening, and Scott and Martin had stayed up late catching up and had woken up at 3:00 am for their climb. Therefore, Scott had no recent experience with the local snow conditions and we do not know if he checked the recent weather. He was probably following Martin's lead as Martin had climbed Stairs Gulch before and Scott had not.

On the Wednesday previous to the accident, Martin and two other friends attempted to climb Tanners Gulch (another nearby large and steep avalanche path in Little Cottonwood Canyon), but they turned around because of wet snow conditions as they were sinking in deeply. (The temperatures Wednesday morning were about 15 degrees cooler than Saturday, the day of the accident.) When Scott and Martin ascended Stairs Gulch on Saturday, they may have been fooled by the supportable snow conditions as they walked on old avalanche debris, which tends to be quite hard even in warm temperatures.

Both were extremely intelligent people who were very attentive of their day-to-day life decisions as well as their own personal safety. Although they took an avalanche course at one time, most of their friends reported that they were still relative avalanche novices. Also, although they both kept very fit and liked to hike in the mountains (Scott was an avid mountain runner and marathoner) they were still considered to be intermediate climbers.

THIS WAS AN UNUSUAL ACCIDENT FOR A NUMBER OF REASONS:

Most fatalities involve dry slab avalanches, yet this was most likely a glide avalanche and, as far as we know, no one has ever been killed in Utah by a glide avalanche.

The vast majority of avalanche fatalities in Utah trigger the avalanche that catches them, yet these two almost certainly did not trigger the avalanche.

Most avalanche fatalities in Utah do not call the avalanche advisory before heading out, yet Martin Gleich regularly called the avalanche advisory (although his wife did not know if he called it in the days before the accident).