Stanserhorn, Stans (NW), February 24 2012 – Excavator driver buried by full depth snowslide while clearing snow.¹

A full-depth snowslide released while clearance work was taking place to remove the avalanche deposits of the previous day from the forest road leading to Bluematt. The posted lookout alerted the excavator operator, who leapt from his cab but was unable to reach safety in time. He was buried more than 2 m deep in the avalanche; around 75 minutes elapsed before his body was recovered by rescuers.

Sequence of events and rescue mission

On the morning of February 24 the operations manager and two employees of the Stans Public Utilities cooperative set off on the forest road towards Bluematt (1200 m). Their assignment was to clear away avalanche deposits of the previous day from the forest road so that they could subsequently carry out work at the location of the second pylon of the Stanserhornbahn cableway.

The gang were driving an excavator and two goods vehicles. At around 10 am they began the avalanche deposit clearing operation in the Grosslangzug section of the track. While one of the gang was clearing the road with the excavator, another was posted on the avalanche cone to observe the slope. The third member of the gang was in a safe place about 50 m away when, at around 10.15 am, a full-depth snowslide was suddenly released about 200 m further up (Fig. 1). The lookout shouted "Avalanche !" to his colleague in the excavator before guickly seeking cover himself. The excavator operator leapt from the cab in order to escape the danger area as well. He was caught by the snow masses immediately alongside the vehicle and buried to a depth of around 2 m.

In the absence of any avalanche emergency equipment, the victim was not located until an avalanche dog arrived at the scene; he was uncovered after a period of about 75 minutes. Despite having access to a pocket of air, he had suffocated.

Weather and avalanche situation

There had been no precipitation on the three days preceding the accident. The zero-degree level was rising significantly in altitude, from approximately 500 m on February 20 to approximately 2700 m on February 24 (Fig. 2). On the night before the accident the skies were clear. The profile taken on a north facing slope the day after the accident indicated a partly moist snowpack (Fig. 3).



FIGURE 1 – Rescuers uncovering the snow clearing vehicle on the forest road to Bluematt on the Stanserhorn in canton Nidwalden (February 24 2012, photo: Nidwalden cantonal police).

Extract from the National Avalanche Bulletin for February 24 2012, valid for the region in which the accident occurred:

Avalanche danger forecast:

Moderate danger of dry avalanches (level 2). The avalanche prone locations are to be found primarily in southwestern to northern to southeastern aspects above approximately 1600 m. The major peril stems from older snowdrift accumulations which have generally been blanketed over by last week's snowfall. These avalanche prone locations are discernible only with difficulty. Avalanches can still be triggered by a single backcountry skier or freerider in isolated cases. A cautious route selection, as well as maintaining distances between persons when ascending the mountainside and descending singly are important.

- Danger of moist and wet avalanches.

Through solar radiation and the daytime warming cycle, the danger of moist and wet avalanches is expected to escalate significantly over the course of the day. On the Main Alpine Ridge and northwards thereof, danger Level 3 (considerable) will be reached. On east, south and west facing slopes below about 2400 m in par-

^{1.} Extract from: Techel, F., Pielmeier, C., Darms, G., Teich, M., Margreth, S. 2013: Schnee und Lawinen in den Schweizer Alpen. Hydrologisches Jahr 2011/12. WSL Ber. 5: 118 S., Seiten 70 – 72, Translation: TTN Translation Network

ticular, small sized, in isolated cases medium sized naturally triggered avalanches can be expected. Such avalanches can be triggered even by a single backcountry skier or freerider. Tours in outlying terrain should be brought to a close early in the day. In addition, below about 2400 m, full depth snowslides are possible which can, in isolated cases, place exposed sections of transportation routes at risk. Caution is urged below glide cracks.



FIGURE 2 – Change in zero-degree level between February 18 and 24 2012. On February 24 the zero-degree level rose to 2400 m and then to 3200 m. The zero-degree level was calculated from data collected by 11 automated ENET measuring stations distributed throughout the entire Swiss Alps assuming a temperature drop of 0.6 degrees per 100 m altitude (mean: blue line, grey area: dispersion of values recorded by the 11 stations).



FIGURE 3 – Snow profile taken at 1450 m on a north facing slope the day after the accident. For safety reasons, it was taken on an adjacent slope in a similar aspect, but at an altitude approximately 200 metres higher. At the profile site the snowpack was still dry to some extent, but to some extent already moist.

Remarks

Winter 2011/12 was characterised by exceptionally high full-depth snowslide activity. Since the snowpack depth was above average over an extensive area, medium-sized and sometimes large full-depth snowslides were common. In particular during the period from December 2011 until the end of February 2012, full-depth avalanches occurred at every time of day and night. The snowpack was often moist only at the interface with the ground and otherwise mostly dry. Wet and full-depth avalanche activity was especially high as the snowpack became increasingly moist on February 24/25 and at the beginning of March. Thereafter the fulldepth avalanche activity returned to a greater dependence on the time of day.

Since this avalanche accident occurred while the victim was at work and various persons were responsible for his assignment, the public prosecutor's office initiated a criminal investigation. Two persons are being prosecuted but the case is still pending as of the date of the present report.

TABLE 1 – Weather conditions in the region where the accident occurred, as measured by manned and automated stations. The indicated figures are mean values (for wind and temperature) and the quantity of fresh snow in 24 hours. The manual readings are taken at 8 am, and the automated measurements refer to a 24-hour period from midnight to midnight.

| Date | Air temp. (°C) PIL ^a | mean wind strength (km/h)/direction PIL ^a | Fresh snow (cm) TIT2 ^b | Fresh snow (cm) 2RI ^c |
|------------|------------------------------------|---|--------------------------------------|-------------------------------------|
| 20.02.2012 | -11 | 19–N | 23 | 9 |
| 21.02.2012 | -4 | 11–E | 0 | 0 |
| 22.02.2012 | 0 | 17–NE | 0 | 0 |
| 23.02.2012 | 0 | 15–SW | 0 | 0 |
| 24.02.2012 | 4 | 8–W/NW | 0 | 0 |

^a PIL: ANETZ station Pilatus 2106 m; distance of 6.1 km.

^b TIT2: IMIS snow station Titlis 2140 m; distance of 17.4 km.

^c 2RI: Observer station Rigi-Scheidegg 1640 m; distance of 16.1 km.

| Avalanche data | | | |
|---|------------------------|---------------------------------------|---|
| Avalanche - approx. 10.15 am | | | |
| Map nr. | 1170 | Min. fracture depth (cm) | 30 |
| Length (m) | 200 | Mean fracture depth (cm) | 40 |
| Width (m) | 50 | Max. fracture depth (cm) | 50 |
| Terrain | | | |
| Aspect | Ν | Slope angle on map (°) | 35 |
| Altitude (m) | 1340 | Type of terrain | Forest aisle, bowl |
| Release information | | | |
| Release type | natural | Safety distances | - |
| No. of triggering persons | - | Activity | Maintenance |
| No. of involved persons | 1 | Tracks | _ |
| Involved person 1 st person | Injury fatal | Type of burial fully buried | Duration of burial 1 hour 15 min. |



FIGURE 4 – Map section of accident site (1:25,000, national map sheet 1170) showing the outline of the avalanche (red) and the place where the victim was found (black cross). Map reproduced with permission from swisstopo (JA100118/JD100040).