



**Final Report
of the Aircraft Accident
Investigation Bureau**

concerning the accident

of the Helicopter Schweizer Aircraft Corp. 269C, HB-XZC

on 21 July 1999

Adelboden im Eselsmoos / BE

Ursache

Der Unfall ist auf einen Verlust der Kontrolle des Piloten über den Helikopter nach einem Startabbruch aufgrund der für diese topografischen und meteorologischen Bedingungen ungenügende Leistung zurückzuführen.

Zum Unfall beigetragen haben:

- Operation des Helikopters an den Betriebsgrenzen gemäss PFM
- Ungenügende Unterlagen zur Leistungsberechnung im PFM
- Zu optimistische, im PFM publizierte Werte, für den Schwebeflug HIGE und HOGE
- Ungünstige Wahl der Landezone
- Geringe Gebirgsfahrung des Piloten auf dem Helikoptertyp
- Unterschätzen der plötzlich auffrischenden Winde.

Sicherheitsempfehlungen

Das BFU empfiehlt dem BAZL:

- Die zu optimistischen HOGE und HIGE Tabellen im PFM des Helikopters Schweizer 269C sind zu überprüfen und anzupassen. Der Einfluss der Zusatzausrüstungen (*muffler, resonator, abrasion tape*) ist entsprechend zu berücksichtigen.
- Eine zwischenzeitliche temporäre Einschränkung des Betriebs des Helikopters Schweizer 269C ist zu prüfen.

Federal Department of the Environment, Transport, Energy and Communications
Aircraft Accident Investigation Bureau

Final Report

This report has been prepared for the purpose of accident/incident prevention. The legal assessment of accident/incident causes and circumstances is no concern of the incident investigation (art. 24 of the air navigation law)

| | | |
|--------------------------------------|--|---|
| Aircraft | Helicopter, Schweizer Aircraft Corp. 269C | HB-XZC |
| Keeper | GALLAIR AG, Zürichstrasse 68A, 9000 St. Gallen | |
| Owner | GALLAIR AG, Zürichstrasse 68A, 9000 St. Gallen | |
| Pilot | Swiss citizen, born 1966 | |
| Licence | For commercial pilots (helicopter cat.) | |
| Flying hours | Total | 416:47 |
| | During the last 90 days | 131:51 |
| | On the accident type | 148:30 |
| | During the last 90 days | 131:51 |
| Location | Adelboden im Eselmoos / BE | |
| Coordinates | 608 525 / 147 800 | Elevation 1430 m above sea level |
| Date and time | 21 July 1999, approx. 10:30 local time (UTC + 2) | |
| Type of operation | Commercial / photography flight | |
| Flight phase | Take-off | |
| Type of accident | Aborted take-off | |
| Injuries to persons | | |
| | Crew | Passengers |
| | Third parties | |
| Fatally injured | --- | --- |
| Seriously injured | --- | --- |
| Slightly injured or uninjured | 1 | 1 |
| Damage to aircraft | Seriously damaged | |
| Third-party damage | Farmhouse slightly damaged | |

HISTORY

The following information is based on statements from the pilot.

The helicopter took off at 08:25 ⁽¹⁾ in Sion in the direction of Sanetschpass. On board were the pilot and a photographer, plus the necessary photographic equipment. Both tanks were full. The intention was to carry out a photographic flight in the Adelboden area. After about 25 minutes flying time they landed near the Simmen falls.

The flight resumed at about 10:00 towards Adelboden. In the area 5 km to the west of Adelboden they made a weather reconnaissance flight and decided, because of inadequate sunlight for photography, to look for a suitable landing site. The helicopter landed after a total flying time of 37 minutes (since taking off in Sion) on a hill south-west of Adelboden. There was no wind.

After a few minutes the wind freshened (quote): *"Since the weather had improved somewhat for photography in the target area after about 10 minutes and since I wanted to make the most of the wind conditions at that time, I decided to take off immediately"* (end quote).

At approximately 10:30 the helicopter lifted off. The pilot first controlled the helicopter in hovering mode at the northern edge of the dome of the summit, as far as the high-voltage line. He then accelerated along the hill in a southerly direction and, having reached the end, the pilot decided to abort the landing when he realised that he could not build up sufficient speed and height. He turned the helicopter to the right, back towards the dome of the summit. Having done this he was no longer in a position to maintain height. The first contact with the ground was with the skids below the summit, in a steep area. Subsequently, the helicopter rotated around its vertical axis down the slope and came to rest next to a farmhouse.

The pilot and the photographer were uninjured. The helicopter was seriously damaged and there was third-party damage to the building, agricultural machinery, trees and the land.

FINDINGS

- The pilot possessed a commercial pilot's licence (helicopter cat.), valid till 14.05.2000.
- The pilot completed conversion to the Schweizer 269C type on 30.03.1999.
- On 20.04.1999 five landings above 1100 m above sea level are entered in the logbook.
- The helicopter was authorised for commercial daytime VFR operation.
- The last 400 h check was carried out on 30.06.1999.
- The pilot did not mention any technical faults which may have contributed to the accident.
- The unladen mass of the helicopter, when it was last weighed on 20.03.1996, was 1169.9 lbs. (530.6 kg).
- The helicopter was equipped with one main tank and one additional tank (30 and 19 US gallons respectively).

⁽¹⁾ All times are local times (UTC +2)

- The mass at the time of the accident, according to the pilot's information, was 821 kg.
- The centre of gravity was within the prescribed limits.
- The helicopter was equipped with a "MUFFLER KIT INSTALLATION" (muffler) P/N 269A8801-5.
- On 20.4.1999 the helicopter was fitted with three new main rotor blades. According to the documentation, the "MAIN ROTOR BLADE TAPE KIT" (abrasion tape) P/N M10060-1 was not fitted.
- The manufacturer has commented as follows on the performance calculation:
(Quote): "*With the given facts, the aircraft was near or at the pressure altitude limits for OGE hover.*" (end quote)
- The table for hovering out of ground effect (HOGE) is not included in the part of the pilot's flight manual (PFM) approved by the FAA.
- In the chapter of the PFM entitled "ADDITIONAL OPERATIONS AND PERFORMANCE DATA", which is not approved by the FAA, there is a table for hovering out of ground effect (HOGE), but only for the standard helicopter, without muffler and abrasion tape.
- Another Swiss company with extensive experience in training operations imposes limitations on its operations with the same helicopter.
- A comparison flight showed that these limitations approximate to practicable values.
- The values published in the PFM for HIGE and HOGE hovering are clearly overly optimistic.
- Weather at the time and site of the accident according to MeteoSchweiz:

General meteorological situation:

Under the influence of a depression with its centre to the west of Norway, a weak cold front is approaching the north side of the Alps. At lower levels in particular, it is bringing moist air to the alpine region.

Weather at the time and site of the accident:

| | |
|-----------------------|---|
| Weather /cloud: | 2-4/8 Sc/Cu base approx. 3000 m/MSL, 3-5/8 base around 3900 m/MSL. At an altitude of approx. 2200-2400 m/MSL presumably some Sc, esp. in valleys. |
| Visibility: | 8-10 km |
| Wind: | The following conditions were ascertained at the measuring station in the village of Adelboden: until approx. 10:30 LT VRB/02kt/MAX08kt, between 10:30 and 10:40 LT there was a marked strengthening of the wind to approx. 200°/10kt, gusts up to 21kt. It is probable that this sudden wind change reached the location of the accident, which is higher and more to the south-west, earlier than the time recorded at the Adelboden measuring station. |
| Temp./Dewpoint: | 18°/11°C |
| Atmospheric pressure: | 1019 hPa QNH (LSGS) |
| Hazards: | Sudden turbulence |
| Position of the sun | Azimuth 107°; elevation 43° |

ANALYSIS

Technical aspects

The pilot did not claim that there were any technical faults which may have contributed to the accident.

An on-the-spot visual assessment of the helicopter revealed no abnormalities.

Operational aspects

Landing area:

The landing area can be characterised as follows:

- An extended dome
- Obstacles on all sides (cables, antenna, power lines and telephone lines)
- Rising land on two sides

The performance calculation had to be made for out of ground effect hover (HOGE).

Power calculation:

The manufacturer has commented as follows on the performance calculation:

(Quote): *"With the given facts, the aircraft was near or at the pressure altitude limits for OGE hover."* (End quote)

The HOGE table in the pilot's flight manual (PFM) is not approved by the FAA. The manufacturer comments as follows:

(Quote): *"The FAA approves those performance charts included in Section V and other sections of the PFM but does not certify the additional performance data/charts provided in the supplement data section of Section VII of the PFM. There is no FAA requirement to certify that data. The manufacturer provides that data as a customer service to inform the pilot of additional aircraft capabilities and maximize customer utilization. The manufacture engineering flight tests are used to substantiate the data provided in the additional performance charts."* (end quote)

The GALLAIR company operates the helicopter in accordance with the pilot's flight manual.

Another Swiss company with extensive experience in training operations imposes the following restrictions on its operations with the same helicopter:

(Quote): *"Hover ceiling calculations must all be made **Out of Ground Effect** (page 8-2). **Approx. 2000 ft must be deducted** from the values derived from the HOGE tables. This measure is imperative since the values cited in the HOGE table are overly optimistic and cannot be achieved in practice."* (end quote)

A comparison flight showed that these limitations approximate to practicable values. The discrepancy in relation to the published data, however, increases with pressure altitude.

For a landing mass of 1696 lbs. at a pressure altitude (PA) of 5800 ft and a temperature of 60°F, HIGE hover was possible at approximately 50 cm. Under these conditions, the following values should be achieved according to the PFM:

- HIGE: approx. 9180 ft PA
- HOGE: approx. 7200 ft PA

The performance data (HOGE and HIGE) are clearly overly optimistic and cannot be achieved in practical operation.

The pilot does not have at his disposal any documentation for performance calculation (HOGE) in the configuration with a muffler.

It is relatively difficult for the user to identify the parts of the PFM (pilot flight manual) approved by the FAA. There is no individual marking of the individual pages of the PFM.

No procedure is defined for verifying performance. The manufacturer merely refers to the take-off procedures defined in the PFM, but these do not allow measurement of the power actually being provided.

The pilot completed conversion to the Schweizer 269C on 30.03.1999. He subsequently flew very intensively on this model.

On 20.04.1999 five landings above an altitude of 1100 m above sea level are entered in the logbook. The pilot's mountain experience on this type was minimal.

The helicopter was being operated at its performance limit. With reference to power reserves, the landing area was very confined and an unfavourable choice. The freshening wind further aggravated this situation.

When the pilot realised that performance was inadequate to take off away from the obstacles, he aborted the take-off. This decision is understandable and a good one. For the crew, it very probably avoided even greater damage.

In view of the performance-related and wind situation, the pilot had the possibility of leaving the photographer behind and picking him up again in the valley later, though he did not avail himself of this possibility.

It was a logical consequence that the helicopter, which was already at its performance limit, could no longer maintain height in the tail-wind after the turn and that rotor speed further diminished because of the increased performance requirement.

CAUSE

The accident is attributable to the pilot's loss of control over the helicopter after an aborted take-off due to performance characteristics which were insufficient for the topographic and meteorological conditions.

The following factors contributed to the accident:

- Operation of the helicopter at the operational limits according to the PFM
- Inadequate documentation on performance calculations in the PFM
- Overly optimistic values for HIGE and HOGE published in the PFM
- An inauspicious choice of landing area
- The pilot's lack of mountain experience on this type of helicopter
- Underestimation of the wind, which freshened suddenly.

Safety recommendations

The Aircraft Accident Investigation Bureau recommends that the Federal Office of Civil Aviation:

- Should review and adapt the overly optimistic HOGE and HIGE tables in the PFM of the Schweizer 269C helicopter. The influence of supplementary equipment (muffler, resonator, abrasion tape) should be taken into appropriate account.
- In the meantime, a temporary restriction of operations on the Schweizer 269C helicopter must be examined.

Bern, 30 April 2003

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Landing zone – view direction 330°

Position 1: take off position – hover taxi direction position 2

Position 3: final position of the helicopter



final position of the helicopter – view direction 210°