BEA
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SAFETY INVESTIGATION REPORT

Accident to the PIPER - PA46- 350P registered F-HYGA on 6 August 2021 at Courchevel (Savoie)

Time	11:44[1]
Operator	Private
Type of flight	Cross-country
Persons on board	Pilot and two passengers
Consequences and damage	One passenger fatally injured, aeroplane destroyed
This is a courtesy translation by the BEA of the Final Report on the Safety Investigation. As accurate as the translation may be, the original text in French is the work of reference.	

Approach at low height, collision with a bank below runway threshold, fire

1 HISTORY OF THE FLIGHT

Note: the following information is principally based on statements, radiocommunication recordings and videos taken outside and inside the aeroplane.

The pilot, who wanted to renew his access authorization to Courchevel mountain airfield, took off from Cannes-Mandelieu airport (Alpes-Maritimes) bound for Courchevel at approximately 10:30 with two passengers on board. He contacted the Courchevel AFIS officer at around 11:30, reported to him that he was three minutes south of reporting point W and asked him for the landing parameters. He carried out a 360° for spacing at reporting point W in order to descend to 7,000 ft as indicated on the VAC chart. He then headed towards reporting point N before joining the right-hand base leg for runway 22. He configured the aeroplane for landing.

On final, noticing that the altimeter indicated an altitude close to that of the runway threshold, he then levelled off the aeroplane until the runway threshold. A few seconds before landing, the stall warning sounded, the engine power was increased and then completely reduced. The aeroplane's main landing gear struck the bank located before the runway threshold. The three landing gears ruptured, the tail of the aeroplane rose and then fell onto the runway. The aeroplane slid for around a hundred metres, turning to the right, before coming to a stop on the runway. A fire broke out on the right side of the aeroplane. The pilot and front passenger exited the aeroplane via the rear door and managed to get the rear passenger out. The latter was unconscious when they pulled him out and died a few minutes later.

[1] Except where otherwise indicated, the times in this report are in local time.

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2 ADDITIONAL INFORMATION

2.1 Aerodrome information

Courchevel mountain airfield is a restricted-use aerodrome. It has a runway oriented 22/04, which measures 536 m long. The threshold of runway 22 is located at an altitude of 6,371 ft, and the runway's profile is as shown below:

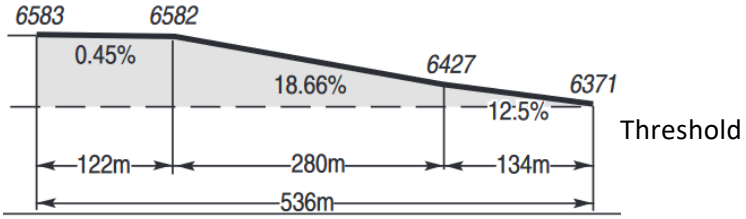
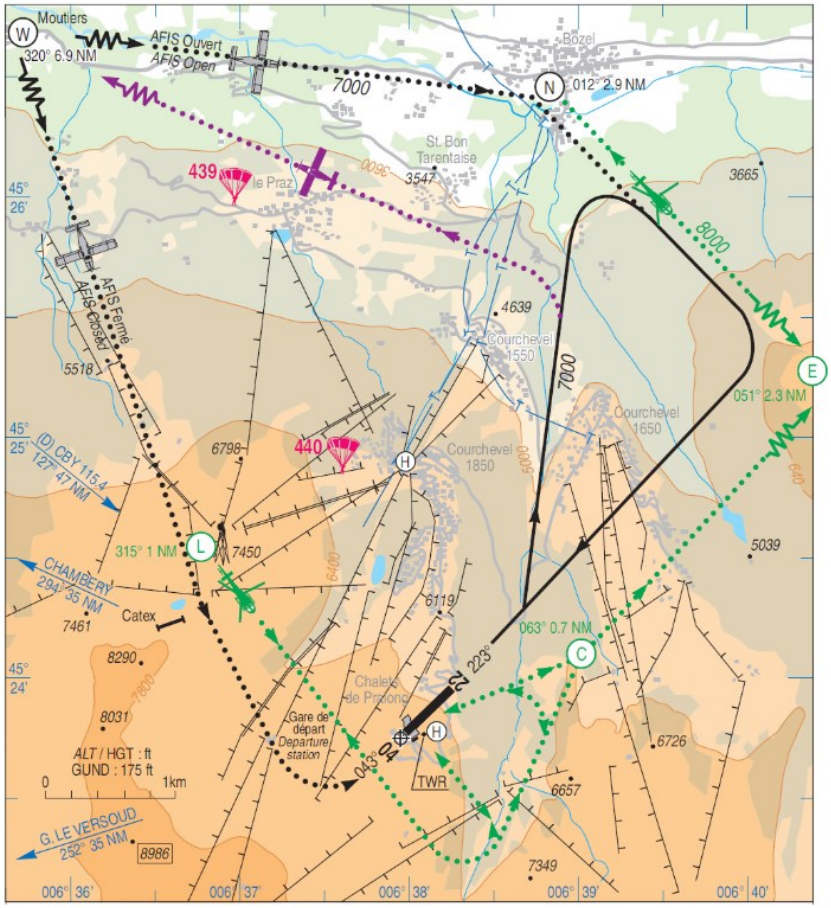


Figure 1: lengthwise profile of runway 04/22 at Courchevel, excerpt from the VAC chart (source: AIS)

The mountain airfield has an AFIS, which was open at the time of the accident. In such a situation, the VAC chart indicates that the QNH value is provided by the AFIS officer so that pilots can set the altimeter reference, and it gives them a route from reporting point W to reporting point N, at an altitude of 7,000 ft, to join the base leg without flying overhead the aerodrome.

As for any approach in a mountainous environment, the final approach should begin with a level-off manoeuvre (in this case, at 7,000 ft) and the descent should only start after intercepting the glide path.



Source : SIA

Figure 2: excerpt from Courchevel mountain airfield VAC chart

2.2 Site and wreckage information

The examination of the site found that the wheels of the aeroplane's main landing gear made contact with the bank one metre before the runway threshold and fifty centimetres below it. The nose landing gear was then on the runway and ruptured a few metres further on. The right fuel tank was punctured, which resulted in a post-impact fire breaking out on the right side of the aeroplane. The aeroplane came to a stop approximately 100 m from the threshold of runway 22, on the runway centreline. It was then oriented at 340°. The elevator trim was found in the neutral position. The flaps were extended to the landing position (36°).

No information was recorded by the various avionics systems of the aeroplane, as the necessary SD cards were not installed.

The examination of the wreckage did not reveal any technical anomaly that might have contributed to the accident.

2.3 Aeroplane information

The Piper PA46 is an aeroplane equipped with a retracting landing gear and a Lycoming TIO 540 piston engine delivering 350 hp, which can carry up to six people. F-HYGA was equipped with a Garmin 1000-type computer. The pilot was the owner of F-HYGA.

The flight manual recommends an indicated approach speed of approximately 80 to 85 kt on final with the flaps fully extended (36°). The stall speed in the landing configuration is 58 kt.

The weight and balance sheet drawn up by the pilot showed that the weight and balance were within the limits defined by the manufacturer.

2.4 Meteorological information

Météo-France stated that, in the area and at the time of the accident, there was a westerly airstream with a few passing altocumulus clouds at around 5,000 ft.

Data from the weather station at Courchevel mountain airfield indicated, at 12:00:

- an average wind from 060° of 8 kt, with gusts up to 19 kt;
- an outside air temperature of 14°C.

The AFIS officer reported a 080° wind of 5 kt on final. The AFIS officer stated that the conditions were favourable for landing that morning.

The videos taken by the passenger showed that the sky was clear with good visibility around Courchevel. During the final approach, the Garmin 1000 display located on the instrument panel (shown on a video recording) indicated a 090° wind of 3 to 4 kt.

2.5 Pilot and right front passenger information

2.5.1 Pilot

The 31-year-old pilot held a Private Pilot Licence - Aeroplanes (PPL(A)) issued in 2013. He had logged 345 flight hours, including approximately 80 flight hours on the PA46, 30 hours of which in the three months preceding the accident.

He completed the training to obtain the access authorization to Courchevel mountain airfield on 20 February 2021, on the PA46, and obtained the “wheel” access authorization on the same day. The pilot had not landed at Courchevel since that day. His authorization was valid until 19 August 2021. He stated that he made a few landings at Megève in dual flight in 2018-2019. He had no other flight or landing experience in mountainous environments.

The accident flight was the first flight that the pilot was making with the passenger seated in the right seat.

2.5.2 Right front passenger

The 35-year-old right front passenger held a valid Airline Transport Pilot Licence (ATPL(A)), along with a valid SEP rating and a valid instructor (FI(A)) rating. He had no experience of mountain flight aside from a few flights made as a pilot on Reunion Island and a few landings at Courchevel as a passenger.

In the same circle of friends, the pilot and the passenger had previously met on a few occasions before the flight.

2.6 Statements

2.6.1 Pilot's statement

The pilot stated that the flight was postponed several times due to adverse weather conditions. He added that he wanted to be accompanied by an experienced pilot for this flight. The pilot stated that he felt he would be able to make the flight if the passenger accompanied him, as the latter had been reassuring about his knowledge of the mountain environment and was an instructor. He thought that the passenger would be able to help him with the flight. According to the pilot, however, the passenger told him before the flight that his profile could be a problem in terms of responsibilities, as he had no rating to land at Courchevel as a pilot, and even less so as a mountain instructor.

The passenger helped prepare the flight. He contacted the AFIS officer at Courchevel by telephone to find out about access procedures, especially in the context of a planned parachute drop. During the descent to reporting point W, the passenger helped the pilot identify the references mentioned on the VAC chart. The pilot felt confident with the passenger and thought that the latter could help him fly the aeroplane during specific phases of the flight. Once the aeroplane was on final, he realised that the passenger had no intention of helping him by inputting on the controls. However, the passenger gave him a few tips on how to maintain the parameters. The pilot called out that he estimated he was too low on the path. He stated that the passenger did not agree with him. However, the pilot decided to level off and called his decision out. He specified that he did not apply power for this level-off and that he did not hear the stall warning. He stated that he then reduced the power and flared.

2.6.2 Right front passenger's statement

He stated that he was invited by the pilot to take part in the flight as a passenger. According to him, he was not expected to exercise any role as an instructor. He explained that the flight had been postponed pending more suitable weather conditions. This decision taken by the pilot gave him confidence in taking part in the flight.

He did not plan to take an active part in the flight. While lining up for take-off from Cannes, when the time came to apply power, he indicated that the pilot unexpectedly handed over the controls to him. The passenger took off and then flew for a few minutes before the pilot took over the controls again.

During the descent from cruising level to the altitude of 7,000 ft required at reporting point W, the pilot asked him whether he should carry out a 360° for spacing to absorb the excess altitude. This proposal seemed appropriate to the passenger. During the turn, the pilot handed over the controls to him on the grounds that, being seated on the right, he would be better able to end the turn. The pilot took over the controls again at the end of the turn.

According to him, the pilot's arrival briefing was very good. The pilot specified the speed he was aiming for and would maintain on final, i.e. 85 kt. According to the passenger, this speed was adopted on final. He estimated that the line maintained on final was good. Moreover, the pilot seemed very focused on the approach path. The pilot called out that he thought he was too low on the path and levelled off. As the passenger noticed that the pilot was not readjusting the power and observed a decrease in speed, he remembered calling out "speed!" twice. When the speed reached 70 kt, he called out "70kt!" while turning to the pilot. He realised that the pilot was only

looking outside the aeroplane, focused on the aiming point. The passenger then pushed the throttle lever to full deflection, putting his hand on that of the pilot. The pilot allowed him to do this. The pilot then reduced power and adopted a nose-up attitude. The passenger stated that he did not understand the reason for doing so. The collision with the bank occurred just after that.

2.7 Read-out of collected video recordings

Four video recordings were retrieved and used by the BEA during the investigation:

- three video recordings made on board the aeroplane were extracted from the rear passenger's phone. These were taken during the approach, including the final approach;
- one video recording of the end of the final approach and the collision with the ground was extracted from the telephone of a witness located at the foot of the AFIS watch tower at Courchevel.

The reconstruction of the aeroplane's path was possible based on crossing points determined using the GPS metadata available at the beginning of the three videos taken with the rear passenger's mobile phone (see **Figure 3**, points 1, 2 and 3). A photogrammetric analysis of the last video taken by the passenger provided a more accurate path of the end of the final approach up to the collision (see **Figure 3**, between points 3 and 4). This video recording also showed the Garmin 1000 display located at the centre of the instrument panel.

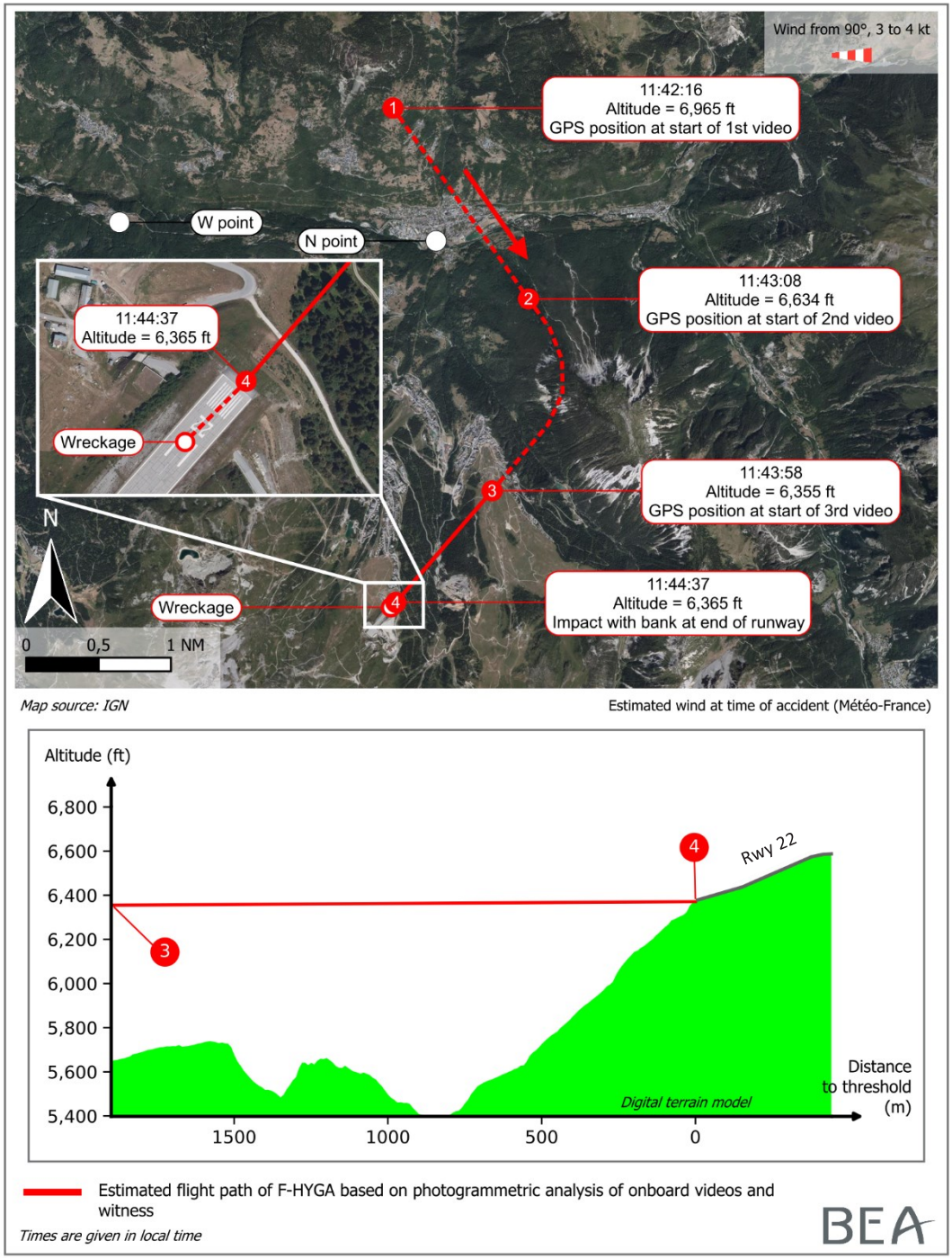


Figure 3: estimated path of the end of the flight

In particular, the read-out of these video recordings enabled the following to be established:

- from reporting point N to the last turn, the approach path was slightly offset to the north compared with the path described on the VAC chart;
- the pilot made the last turn at an altitude below 6,635 ft;
- on final, the aeroplane was in the runway centreline;
- at 11:43:58 (see **Figure 3**, point 3), i.e. approximately 40 s before the collision with the bank, the aeroplane was at an altitude of 6,355 ft and at a distance of approximately 1,900 m from the runway threshold. The ground speed was 93 kt;
- the pilot then maintained level flight until he collided with the bank;

- between 11:44:15 and 11:44:32, the ground speed decreased from 90 kt to 78 kt[2];
- the stall warning triggered when the ground speed reached 78 kt;
- the passenger put his hand on the throttle lever immediately after that. An increase in engine speed could be heard, immediately followed by a decrease in engine speed and then the collision with the bank. This collision occurred at 11:44:37 (see **Figure 3**, point 4).

The analysis of the visual information available from the instrument panel did not show any failure or malfunction of the aeroplane.

2.8 Access authorization to mountain airfields

2.8.1 Issuance conditions and validity

According to the Order of 21 June 2019 specifying the conditions for obtaining access authorizations to mountain airfields[3], pilots who wish to land at a given snow-free mountain airfield must hold:

- the "wheel" mountain flight rating, or
- a "wheel" access authorization, issued by a mountain instructor (MI) after receiving "full and satisfactory" theoretical and practical training.

Pilots holding the access authorization may only land as pilots-in-command at the given mountain airfield if they have made at least one landing as a pilot-in-command within the previous six months. Failing this, holders must make a training flight with a MI to renew their access authorization.

2.8.2 Theoretical and practical training

According to the Order of 21 June 2019, theoretical and practical training can be given either by an instructor (FI) holding a mountain flight rating, or by a MI. This training is signed off by a MI.

At the time of the event, there was no standard training programme for access authorization, contrary to the mountain rating. The Order specified that this training was based on the relevant parts of the training programme for the mountain flight rating described in Commission Regulation (EU) No. 1178/2011 of 3 November 2011.

The pilot indicated that he contacted several instructors and that he chose a mountain instructor whose availability fitted in with his schedule.

The instructor and the pilot stated that the training took place over one day:

- a theoretical briefing in the morning, lasting approximately 1 h and 30 min;
- a practical part on F-HYGA lasting a total of 1 h and 55 min, consisting of seven landings, six of which at Courchevel.

The practical part was as follows:

- take-off from Annecy bound for Courchevel and 50-minute flight, with a reconnaissance overhead the mountain airfield and then three landings;

[2] Given the absence of the longitudinal wind component, this corresponds to a reduction in the true airspeed from 90 kt to 78 kt, i.e. a reduction in the indicated airspeed from 80 kt to 69 kt, in the altitude and temperature conditions that prevailed at the time of the accident.

[3] Version in force on the day of the accident.

- after an initial half-hour break at Courchevel, a 15-minute flight during which a runway circuit was performed;
- after a second break for lunch at Courchevel, a 50-minute flight with two landings at Courchevel, and then return to Annecy.

The instructor explained that this training is “very demanding”, it varies in length and can never be considered as completed if the trainee does not reach the required level. This level is based on a subjective assessment of criteria such as situational awareness, attitude and flying accuracy. The instructor added that he uses a training document on mountain flight published by the French mountain pilots association (AFPM), as well as, to a large extent, his own experience. Concerning the authorization to access a mountain airfield, he uses the 2018 pilot training record template entitled “Autorisation d’accès altiport” provided by the AFPM.

The instructor was not working for an approved training organisation (ATO) or a declared training organisation (DTO).

2.9 Previous accidents and BEA recommendations

Insufficient pilot experience was identified as a contributing factor in a number of landing accidents at mountain airfields in recent years. In particular:

- **The accident to the PC12 registered OO-PCI on 25 February 2017 at Courchevel** brought to light:
  - the duration of the pilot-in-command’s training for the access authorization to Courchevel mountain airfield which was probably not sufficient to give him the skills required to use this mountain airfield;
  - the pilot-in-command’s small amount of experience since obtaining the access authorization.
- **The accident to the PA46 registered F-GUYZ on 8 February 2019 at Courchevel** brought to light:
  - the captain’s absence of experience at Courchevel mountain airfield since obtaining the access authorization;
  - the absence of experience of landing at a mountain airfield in an aeroplane with characteristics different to those of the aeroplane in which he obtained the access authorization.
- **The accident to the DA42 registered F-HIMY on 16 June 2022 at Courchevel** brought to light the instructor’s absence of recent mountain experience in a twin-engine aeroplane and at Courchevel.

Following these investigations, the BEA issued several safety recommendations to the DGAC relating to the conditions for obtaining access authorizations. In particular, as part of the investigation pertaining to the accident to OO-PCI, the BEA recommended that, in its regulations, the DGAC define a training programme for authorizations to access a mountain airfield, to enable pilots to achieve the level of skills required to safely operate an aeroplane bound for or departing from this mountain airfield.

2.10 Amendment to the Order of 21 June 2019

In 2021, the DSAC launched an action plan called "*Plan Montagne*" (Mountain Plan) to define ways to improve safety in mountainous environments. One of the actions identified was to strengthen the conditions for obtaining authorizations to access mountain airfields by updating the Order of 21 June 2019, taking into account the recommendations issued by the BEA as part of the investigation reports pertaining to the accidents to the PC12 registered OO-PCI and to the PA46 registered F-GUYZ.

The Order of 21 June 2019 was therefore amended in July 2023[4] and now specifies, in particular, that:

- the training for obtaining an access authorization is delivered either by an ATO or a DTO;
- the "wheel" and "ski" theoretical and practical training courses be based on:
    - the characteristics of the given mountain airfield, in particular its aerology, and cover all the procedures for using the mountain airfield as well as the associated instructions and limitations,
    - the performance of the class or type of aeroplane or TMG[5] on which the training is delivered.

In addition, after assessing the applicant's skills (abilities, knowledge and attitude), the instructor is now required to deliver appropriate training, based on the programme set out in the appendix to the new Order. This programme lists the topics and sub-topics to be covered:

- general information and best practices;
- flying and navigating in mountainous regions;
- mountain and local aerology;
- aeroplane and engine performance at altitude;
- reconnaissance, runway circuit, landing and take-off;
- topic specific to "ski" training.

3 CONCLUSIONS

The conclusions are solely based on the information which came to the knowledge of the BEA during the investigation.

Scenario

The pilot, accompanied by two passengers, made a flight to Courchevel in order to renew his authorization to access the mountain airfield, which was about to expire. The pilot felt more confident about carrying out the flight with a passenger who was also an experienced pilot and instructor, seated in the right front seat. However, the latter had no landing experience in mountainous environments. During the approach, the pilot started the descent on the base leg and made the last turn at an altitude of approximately 6,600 ft, i.e. 400 ft below the altitude specified on the VAC chart. On final, the aeroplane quickly reached the runway threshold altitude (6,371 ft). The pilot then levelled off at this altitude for approximately 40 s, without increasing the power. The

[4] Order of 07 July 2023 amending the Order of 21 June 2019 specifying the conditions for obtaining authorizations to access mountain airfields.

[5] Touring Motor Glider.

aeroplane's speed gradually decreased until the stall warning sounded on short final. The engine power was increased and then completely reduced before the flare. The aeroplane collided with the bank below the runway threshold.

Contributing factors

The following factors may have contributed to the collision with the bank before the runway threshold:

- the pilot descending too early on approach. The pilot started the descent on the base leg, whereas landing practices in mountainous environments recommend starting the descent on final approach after intercepting the glide path;
- an error in judgement as to the position of the aeroplane in relation to the glide path on final.

The following factors may have contributed to the inadequate management of the approach for landing:

- the duration of the training for the access authorization to Courchevel mountain airfield received by the pilot, which was probably not sufficient to give him the skills required to land safely at this mountain airfield, given his absence of mountain flight experience. The absence of regulations imposing a training programme for an access authorization at the time of the event may have contributed to this lack of training;
- the pilot's absence of landing experience at Courchevel since obtaining the access authorization;
- the misunderstandings between the pilot and one of the passengers about the role of the latter, who was an experienced pilot and instructor, during the flight. This situation influenced the pilot's decision to undertake the flight. It then resulted in interactions and communications which may have affected the way that the pilot managed the approach and perceived the path on final.

Safety lessons

Training to obtain authorization to access a mountain airfield

The specificities of mountain airfield approaches (visual references, path and power management, aerology, flying accuracy, aiming point selection, etc.) require specific skills and abilities. For pilots with no previous experience of landing in mountainous environments, it may be necessary to perform several flights in different weather, operational and environmental conditions in order to acquire such skills required to safely land and take off. This learning process seems hardly compatible with a one-day training period.

Flying single-pilot aeroplanes

When flying single-pilot aeroplanes, pilots-in-command are responsible for conducting the flight and ensuring its safety. The presence of a passenger in the right seat, when that passenger is a more experienced pilot or even an instructor, may, in some contexts, alter the management of some flight phases. Pilots-in-command may then partly rely on the judgement of the person accompanying them. Clearly distributing the roles to each participant before the flight and making everyone aware that this context may constitute a threat to flight safety may reduce the risks associated with such a configuration.