



## **Accident** to the Robinson R44 Raven II registered **F-HARY** on 6 January 2022 at Pas de la Croix

<b>Time</b>	Around 16:10 <sup>1</sup>
<b>Operator</b>	Héliclub du Périgord
<b>Type of flight</b>	Cross country
<b>Persons on board</b>	Pilot and one passenger
<b>Consequences and damage</b>	Pilot and passenger fatally injured, helicopter destroyed
This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in January 2023. As accurate as the translation may be, the original text in French is the work of reference.	

## **Collision with terrain in adverse weather conditions for a visual flight, en route, fire**

### **1 HISTORY OF THE FLIGHT**

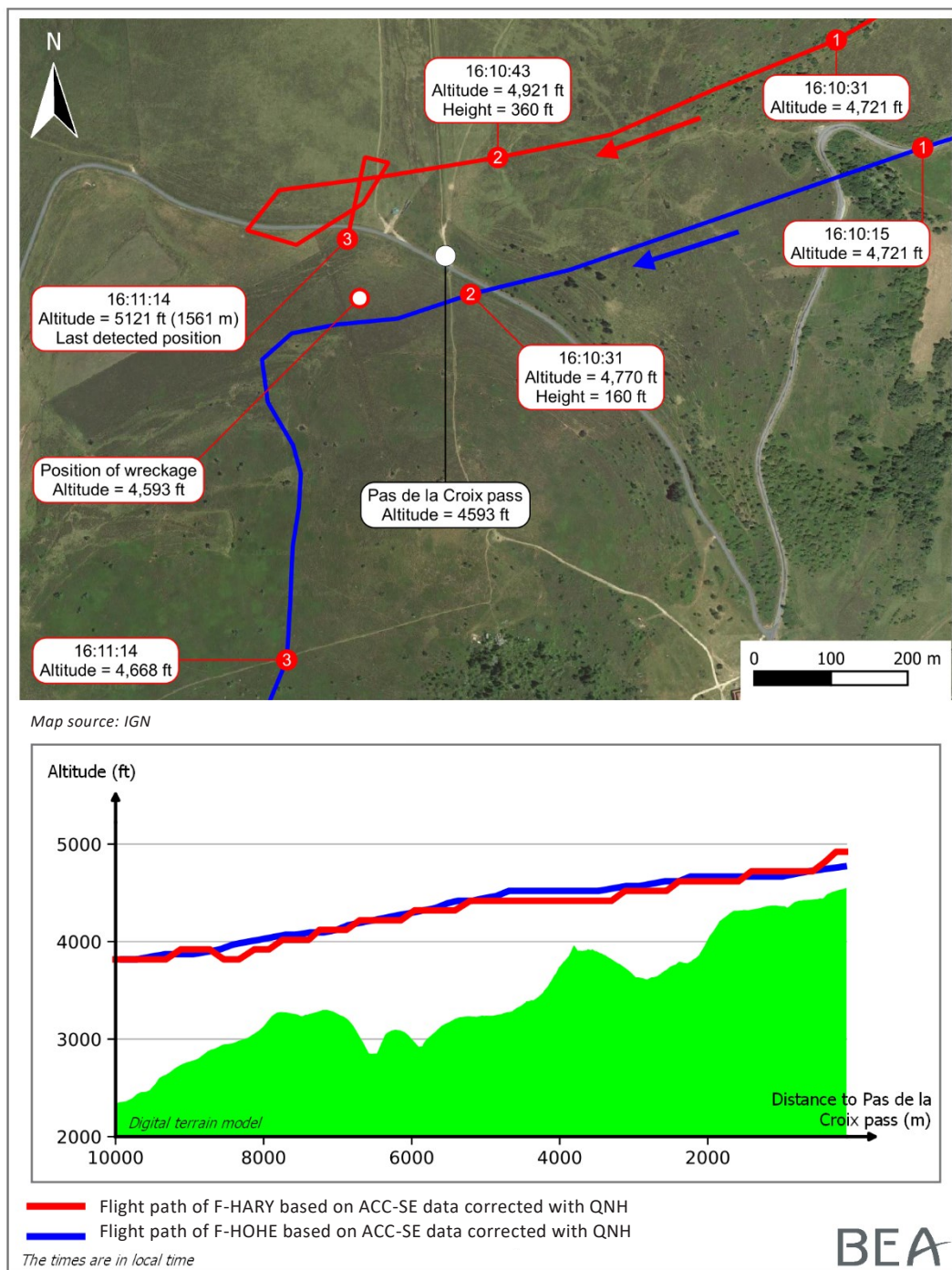
*Note: the following information is principally based on statements, radio communication recordings and radar data.*

The pilot, accompanied by three passengers, took off in the early afternoon from Saint-Crépin et Carluet private aerodrome (Dordogne), where the helicopter club was based, bound for Villefranche-Tarare aerodrome (Rhône). After landing, they took delivery of the helicopter registered F-HOHE, which had just undergone the maintenance inspection, with the objective of ferrying it to the helicopter club. The pilot remained on board F-HARY, accompanied by one of the three passengers from the previous flight, while the other two, instructor and student-pilot, were at the controls of F-HOHE. The pilot of F-HARY took off after F-HOHE at approximately 15:40. The two helicopters climbed gradually, heading towards the Forez Mountains in the Massif Central (see Figure 1, points ❶ and ❶), in adverse weather conditions. While flying over Pas de la Croix<sup>2</sup>, F-HOHE was at a height of around 160 ft (see Figure 1, point ❷). F-HARY reached the area about ten seconds later, at a height of around 360 ft (see Figure 1, point ❷). The pilot of F-HARY initiated a left turn. This turn continued for around 20 s whilst the helicopter was still climbing. The last radar blip was at a height of around 530 ft<sup>3</sup> (see Figure 1, point ❸). The wreckage of F-HARY was found approximately 100 m from the last radar fix. F-HOHE continued its flight up to its destination.

<sup>1</sup> Except where otherwise indicated, the times in this report are in local time.

<sup>2</sup> i.e. an altitude of 1,399 m (4,593 ft).

<sup>3</sup> i.e. an altitude of 1,561 m (5,121 ft).



**Figure 1: flight paths of F-HARY and F-HOHE**

## 2 ADDITIONAL INFORMATION

### 2.1 Site and wreckage information

The wreckage was located on the Pas de la Croix plateau. This plateau slightly overhangs the Col du Béal pass<sup>4</sup>, located approximately 800 m to the south. The wreckage was lying on loose, gently sloping soil covered with low vegetation and about 10 cm of snow. It was severely damaged due to a fire that broke out after impact.

<sup>4</sup> Altitude of 1,387 m (4,550 ft).

No signs of impact were identified in the vicinity of the wreckage. However, the absence of high vegetation and the snowfalls that followed the accident may have prevented any potential signs of impact from being detected. The examination of the wreckage indicated that the helicopter was roughly oriented north-northeast when it collided with the ground with a steep nose-down attitude. It then tipped over onto its left side.

The examination of the wreckage also established the following:

- The ruptures observed resulted from the collision of the helicopter with the ground; however, it was not possible to observe all the ruptures of the flight control linkages due to the extent of damage to the airframe resulting from the fire.
- The main rotor and tail rotor were both rotating at the time of impact. It is very likely that the engine was transmitting torque to the main rotor at the time of impact, although it is not possible to assess the amount of torque.
- The drive system was continuous prior to the collision with the ground.

## **2.2 Helicopter information**

The Robinson R44 Raven II registered F-HARY was a four-seat light helicopter equipped with a Lycoming IO-540 fuel-injected engine. Its equipment included two Garmin radios and a radio selector box to receive two radio frequencies simultaneously, as well as a Garmin GNS 430 GPS.

## **2.3 Persons on board information**

### **2.3.1 On board F-HARY**

The 47-year-old pilot of F-HARY held a Private Pilot Licence - Helicopters (PPL(H)) issued in December 2019. He had logged around 100 flight hours, around 40 hours of which on the R44, and 4.5 hours of which in the three months preceding the accident, all on the R44. He had no other pilot licence. According to the statements, he was often accompanied by a more experienced pilot in cross-country flight, in line with a good practice set by the helicopter club for less experienced pilots. This was the case during the three cross-country flights from Saint-Crépin-Carlucet aerodrome to Villefranche-Tarare aerodrome that he had already had the opportunity to carry out.

During the accident flight, he was accompanied by a passenger who was not a pilot.

### **2.3.2 On board F-HOHE**

An instructor from the helicopter club (at the controls of the helicopter) and a student-pilot were on board F-HOHE. The accident flight was the student-pilot's second instruction flight.

The instructor held a Private Pilot Licence - Helicopters (PPL(H)) issued in 1992, along with R22 and R44 type ratings. He held a restricted Flight Instructor - Helicopter (FI(H)) rating for the R44, issued in September 2021. At the time of the accident, he had logged 640 flight hours, 26 hours of which as an instructor.

## **2.4 Meteorological information**

### **2.4.1 Meteorological information obtained by the pilot before the flight**

The meteorological file provided by the instructor indicated that the METAR reports and TAF forecasts were consulted at around 10:30 for Brive, Aurillac, Clermont-Ferrand, Saint-Étienne and Lyon airports.

In particular, the 0600 TAF forecast for Clermont-Ferrand airport, located 50 km west of the accident site and at an altitude of 1,080 ft, provided the following information:

- visibility greater than 10 km;
- scattered clouds (SCT) at 2,000 ft;
- broken clouds (BKN) at 3,000 ft;
- temporarily, with moderate risk, between 07:00 and 12:00: visibility of 4 km, light snow showers and broken clouds at 1,200 ft.

The METAR report at 10:30 for Clermont-Ferrand indicated overcast at 3,700 ft.

The instructor explained that he contacted the Villefranche-Tarare maintenance workshop<sup>5</sup> at around 11:00 to obtain the meteorological conditions at the aerodrome. The mechanic reported an overcast sky and good visibility.

He added that they did not update the meteorological information afterwards.

#### 2.4.2 Changes in weather conditions during the day

The following data was available prior to the accident flight and was not consulted by the pilot of F-HARY or the instructor on board F-HOHE.

##### SIGWX charts

The SIGWX charts at 13:00 and 16:00 particularly forecast the following on the pilot's path:

- Very cloudy to overcast sky, including stratus clouds with a base varying between an altitude of 800 ft and 1,500 ft and low clouds with a base varying between an altitude of 2,000 ft and 6,000 ft.
- Mountain obscuration.
- Visibility greater than 8 km and locally reduced to values between 1.5 km and 5 km.
- Drizzle or snow locally.
- Moderate icing, from an altitude of 800 ft on the chart at 13:00, and from an altitude of 2,000 ft on the chart at 16:00.

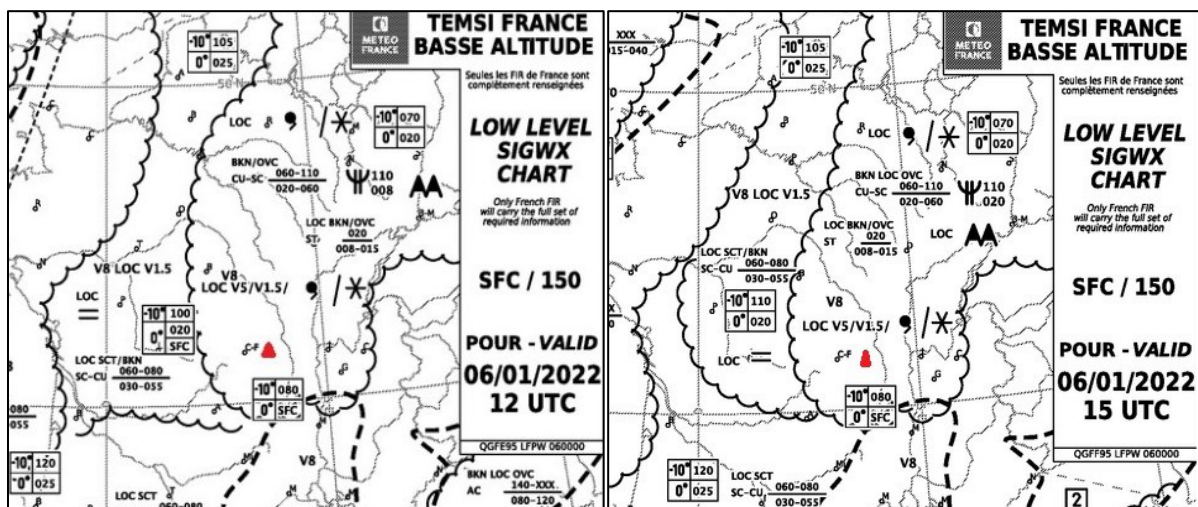


Figure 2: excerpts from SIGWX charts at 13:00 and 16:00 (red triangle: position of the wreckage)

<sup>5</sup> Villefranche-Tarare aerodrome uses the A/A frequency.

### Aerodrome meteorological data (METAR reports and TAF forecasts)

The TAF and METAR for Clermont-Ferrand and Saint-Étienne airports provided the following information:

TAF forecast at 12:00 (valid during the outbound and return flights)		
	Clermont-Ferrand (Alt. 1,080 ft)	-
Few clouds	1,500 ft	-
Broken clouds	3,500 ft	-
	Changing to CAVOK between 15:00 and 18:00	-
METAR report at 13:30 (before take-off for outbound flight)		
	Clermont-Ferrand (Alt. 1,080 ft)	Saint-Étienne (Alt. 1,310 ft)
Few clouds	1,400 ft	-
Broken clouds	3,200 ft	2,900 ft
METAR report at 15:30 (before take-off for return flight)		
	Clermont-Ferrand (Alt. 1,080 ft)	Saint-Étienne (Alt. 1,310 ft)
Few clouds	-	-
Broken clouds	3,600 ft	2,900 ft

All the messages indicated a visibility greater than 10 km.

The data from the TAF and METAR and the SIGWX charts available before the flight could indicate a significant risk of encountering adverse weather conditions at altitude, and in particular on flying over the Col du Béal pass, with low cloud ceilings, locally reduced visibility, as well as potential precipitation and moderate icing. The R44 is not certificated for flight in icing conditions.

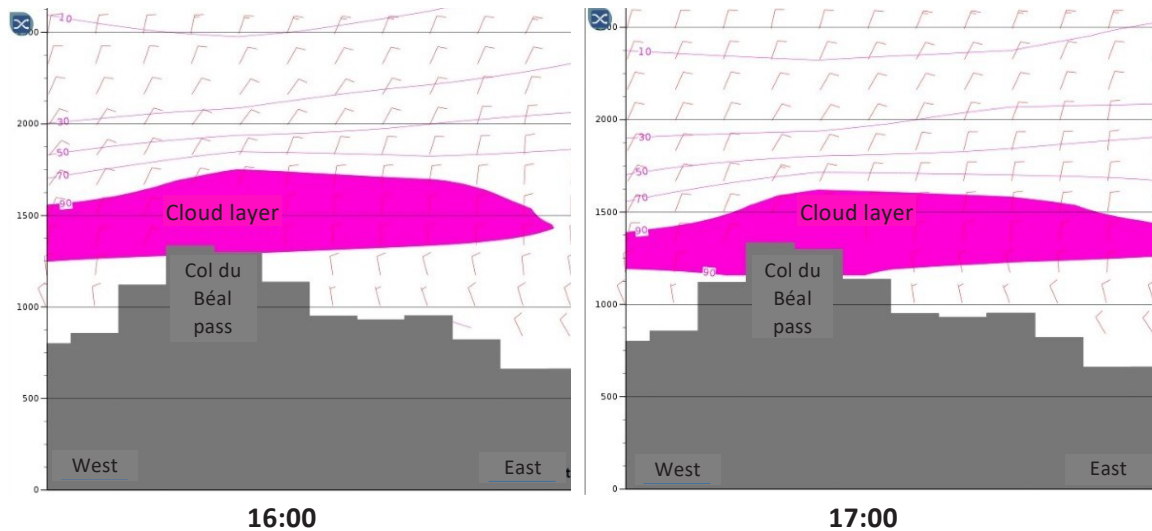
#### 2.4.3 Meteorological conditions observed at the time of the accident

The meteorological conditions estimated by Météo-France in the area and at the time of the accident were as follows:

- The sky was very cloudy to overcast, with a cloud base at an altitude of around 4,200 ft at 16:00 and then around 3,600 ft at 17:00.
- The Col du Béal pass was obscured, with very poor visibility in the cloud layer.
- The outside air temperature was -6 °C, the dew point temperature was -7 °C and the humidity was above 90 % between 16:00 and 17:00.

Figure 3 below shows a cross-section of the terrain, humidity levels in % and vertical winds in the vicinity of the Col du Béal pass. Altitudes are given in metres. The purple zone corresponds to humidity in excess of 90 %, which Météo-France associated with the presence of clouds.





**Figure 3: cross-section indicating humidity > 90 %, based on the AROME model  
(source: Météo-France)**

In addition to this modelling, the following information was gathered.

#### **Chalmazel weather station**

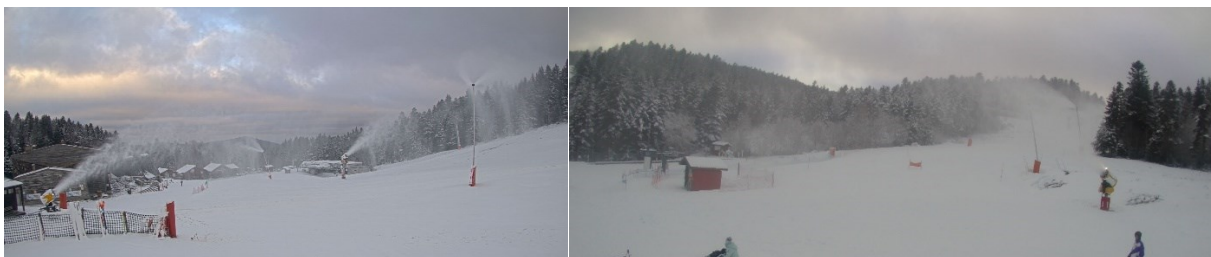
The data from the Chalmazel weather station, located at an altitude of 2,850 ft, 5 km east of the accident site, indicated a humidity of 80% at 16:00.

#### **Chalmazel camera recordings**

The camera recordings from the Chalmazel ski resort, located approximately 1.5 km south-east of the accident site, were as follows:



**Figure 4: Chalmazel camera recording (1,460 m - 4,790 ft) - 16:10**



**Figure 5: Chalmazel camera recording (1,100 m - 3,608 ft) - 16:05**

**Aerodrome meteorological data (METAR reports)**

METAR report at 16:00		
	Clermont-Ferrand (Alt. 1,080 ft)	Saint-Étienne (Alt. 1,310 ft)
Visibility	Greater than 10 km	Greater than 10 km
Few clouds	1,400 ft	-
Broken clouds	3,200 ft	2,900 ft
Outside air temp	4 °C	3 °C
Dew point temp	-2 °C	-3 °C

All of this information showed that at the time of the accident, the weather conditions when flying over the Col du Béal pass were unfavourable for visual flight.

**2.5 Statements****2.5.1 Instructor on board F-HOHE statement**

During a dinner at the aero club the day before the accident, the instructor mentioned the possibility of going to Villefranche-Tarare the next day on board F-HARY, to pick up F-HOHE and ferry it to the helicopter club, as the weather forecast seemed favourable. Of the pilots present, only the accident pilot was available and, according to the instructor, volunteered for an afternoon flight.

He explained that they met up at the helicopter club the next morning. They consulted the weather reports and forecasts and confirmed the flight for the afternoon. The pilot of F-HARY then went to work. The instructor suggested that a student-pilot accompanied them and used the return flight for an instruction flight. They searched for a fourth person to take part in this trip, so that the pilot of F-HARY would not be alone on board the helicopter on the return flight. No other pilot from the club was available, so the student-pilot invited a friend. The four participants in the trip then met at the helicopter club at approximately 13:00.

The instructor specified that in his opinion, the weather conditions were not “adverse” on the outbound flight. They only observed a thin cloud layer hanging over the Forez mountains, leading them to deviate from the planned flight path and to bypass the area to the north<sup>6</sup>.

He indicated that during the stopover at Villefranche-Tarare (which lasted approximately 45 min), they did not consult the latest weather information available. They picked up F-HOHE and took off.

He was accompanied by the student-pilot on board F-HOHE. The pilots of both helicopters did not hold any specific briefing before the flight. It was expected that the student-pilot and instructor on board F-HOHE would use the path provided by the GPS and that the pilot of F-HARY would follow them. Apart from a radio test performed before take-off over the 123.45 MHz frequency selected for communication between the pilots during the flight, no other radio communication took place between them. The instructor added that he was not aware of the position of F-HARY after take-off and assumed that the helicopter was following him.

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<sup>6</sup> The radar track of the outbound flight confirmed this bypass.

As he approached the plateau of Col du Béal pass, he noticed a band of clouds below the pass, leading him to slow down. After flying over the pass, he turned left in descent to avoid entering the cloud layer. He estimated that the cloud base overhead the pass was around 40 m above the ground.

According to him, there was no particular pressure to pick up F-HOHE that day.

#### **2.5.2 Student-pilot on board F-HOHE statement**

He indicated that the pilot of F-HARY did not seem to be stressed or hesitant on the day of the accident. He did not attend the preparation for the outbound flight on which he was a passenger and did not remember any particular preparation for the return flight during the stopover at Villefranche-Tarare, where he said the sky was overcast with good visibility. He remembered there was snow at the Col du Béal pass, as well as a band of clouds that the instructor avoided by descending.

### **2.6 ATC communication**

At 15:56 and 15:57, the pilots of F-HOHE and F-HARY contacted Clermont INFO over the 120.500 MHz frequency. The helicopters were then flying in Class E airspace. The pilots informed the controller that they were flying together, and the controller insisted that the pilot of F-HARY kept sight of his colleague.

At 16:06, the controller asked the pilots to call him back over the 122.225 MHz frequency. The helicopters changed to another flight information sector and were then flying in Class G airspace. Both pilots read the message back, but only the pilot of F-HOHE contacted the controller over the new frequency. No radio communication took place between the pilot of F-HARY and the controller over the 122.225 MHz frequency.

At 16:11, F-HARY disappeared from the radar screen.

At 16:16, the pilot of F-HOHE asked the controller for the position of F-HARY. The controller then noticed that F-HARY had disappeared from the radar screen.

The Clermont-Ferrand five approach sectors were combined. The controller explained that he did not notice when F-HARY disappeared from the radar screen, because his attention was focused on managing the traffic to the north and the coordination problems with other control centres. He also specified that he was not aware of the weather conditions in the area of the accident<sup>7</sup>, in which the two helicopters were the only VFR aircraft flying.

The controller activated the ALERFA alert phase at 16:28. F-HARY's emergency locator transmitter did not transmit any signal.

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<sup>7</sup> The systems used by the ATC only display storm areas.



### 3 CONCLUSIONS

*The conclusions are solely based on the information which came to the knowledge of the BEA during the investigation. They are not intended to apportion blame or liability.*

#### Scenario

The pilot, accompanied by three passengers including an instructor from the helicopter club, made the outbound cross-country flight, having consulted the weather reports and forecasts several hours before take-off. These were already mentioning a cloud layer near the Massif Central. This layer was observed and avoided on the outbound flight. For the return flight, it was expected that the pilot of F-HARY would follow the instructor from the helicopter club, who would then be on board a second helicopter registered F-HOHE. The pilot and instructor did not consult the latest available meteorological information before the return flight. These confirmed the adverse weather conditions. When they approached the Col du Béal pass and Pas de la Croix, clouds were present near the terrain, obscuring it and forcing the pilots to fly at low height. The pilot of F-HARY probably initiated a left turn to follow F-HOHE. The helicopter most likely entered the cloud layer during the turn, depriving the pilot of external visual references and causing him to experience spatial disorientation.

#### Contributing factors

The following factors may have contributed to the pilot of F-HARY losing visual references:

- Insufficient flight preparation by the two pilots, in particular the absence of a briefing before carrying out a flight with two helicopters and the failure to take into account the meteorological information available before the flight.
- The decision of the two pilots to continue the flight in adverse weather conditions for a visual flight.
- The flight being organised by an instructor from the helicopter club, which may have influenced the pilot of F-HARY's decision to take part in the ferry flight; the presence of the instructor on board the helicopter flying ahead of F-HARY during the return flight may have encouraged the pilot of F-HARY to undertake the flight without the required preparation, and then to continue with it despite the degraded weather conditions.
- The lack of communication between the pilots of the two helicopters during the flight.

***The BEA investigations are conducted with the sole objective of improving aviation safety and are not intended to apportion blame or liabilities.***