

DATA SUMMARY

LOCATION

Date and time	Saturday, 24 August 2012; 18:43 local time
Site	Guils de Cerdanya (Girona)

AIRCRAFT

Registration	EC-KTU
Type and model	EUROCOPTER AS-350-B3
Operator	TAF Helicopters, S.L.

Engines

Type and model	TURBOMECA ARRIEL 2B1
Number	1

CREW

	Pilot in command	Flight operator ¹
Age	40 years old	27 years old
Licence	CPL(H)	CPL(H)
Total flight hours	6,632 h	683 h
Flight hours on the type	1,495 h	254 h

INJURIES

	Fatal	Serious	Minor/None
Crew			2
Passengers			
Third persons			

DAMAGE

Aircraft	Significant
Third parties	

FLIGHT DATA

Operation	Aerial work – Commercial – Firefighting
Phase of flight	Maneuvering – Low-altitude flight

REPORT

Date of approval	29 April 2013
------------------	----------------------

¹ Crewmember described in the operator's Operations Manual, approved by the competent Authority, whose specific functions are described in said Manual.

1. FACTUAL INFORMATION

1.1. History of the flight

On Saturday, 11 August 2012, a helicopter with registration EC-KTU was taking part in fighting a forest fire that was burning bushes, dry grass and a few scattered trees on the west face of the Pregón Ravine, located some 2 km southwest of the town of Guils de Cerdanya (Lleida).

The helicopter was equipped with a firefighting system that consisted of a belly tank for transporting water and a hose with a suction pump hanging down from the side of the tank. Part of the hose and the pump were hanging 3.25 m below the right skid.

The helicopter took part in two firefighting flights, the first lasting one hour and fifteen minutes, during which the crew took on water 17 times and made an equal number of drops. Forty minutes after landing, the crew resumed operations, taking off at 16:55 to continue assisting with the firefighting efforts.



Figure 1. Helicopter with the Simplex 310 firefighting system attached

One hour and forty-eight minutes into this final flight, while making pass number 23 to drop water on the fire, the crew heard a noise that sounded like an impact, followed by a slight destabilization of the aircraft and growing vibrations. The pilot was able to continue flying for about thirty seconds before making a power-on landing nearby.

Once on the ground, the crewmembers, who were uninjured, noticed that the hose for the suction pump on the firefighting system was resting on the engine exhaust nozzle. The suction pump was broken and there was damage to the helicopter frame and to the main rotor blades.

1.2. Damage to aircraft

Two of the three main rotor blades were damaged. One had damage on its bottom surface and the other had lost a section of material measuring approximately 100 cm long by 15 cm wide.

The main structure exhibited impact damage near the section where the tailboom is attached, near the cargo door.

There was a 32-cm long crack and orange paint marks, similar to the suction pump paint, on the tailboom, forward of the right horizontal stabilizer.

The charred remains of the hose used to fill the tank of the firefighting system installed on the helicopter were found at the top of the engine exhaust nozzle.

Part of the firefighting system fill hose was burned and the suction pump had been broken by an impact against something solid.

1.3. Personnel information

The flight crew consisted of a pilot and a flight operator seated in the copilot's seat.

Pilot

The pilot had a valid Commercial Helicopter Pilot license, an AS-350 type rating and an agricultural (firefighting only) rating. He had a medical certificate that was valid and in force until 17 January 2013. In February 2012 he had taken a Crew Resource Management (CRM) course. In April 2012 he had taken the refresher agricultural (firefighting only) training by conducting water drops.

He had a total of 6,632 verifiable flight hours, of which 1,495 had been on the type. He had flown 8 h in the seven days before the event, 29:24 h in the 30 days before and 79:42 h in the 90 days before. He was on duty at the base for 12 hours a day for six- or seven-day periods, followed by an equal number of rest days.

The pilot had logged a total of 1,700 h in firefighting flights over various firefighting seasons since 1995.

Flight operator

The flight operator had been engaged in flight duties since 2007, and obtained his Commercial Helicopter License in March 2008. He had a total of 683 flight hours, of which 295 had been as a Flight Operator and 254 as an AS-350 pilot, for which he had the required rating.

The continuous training records showed he had taken a CRM course in May 2009, a Flight Operator course in May 2012 and periodic training in January 2012.

1.4. Aircraft information

The helicopter was a Eurocopter AS-350-B3 model, registration EC-KTU and serial number 4520. It had been manufactured in 2008. The Airworthiness Certificate was valid until 17 July 2013 and it had been maintained in accordance with the approved maintenance program. The last inspection, a 100-hr check, had been on 20 June 2012 with 1,268 flight hours.

The Simplex 310 firefighting system installed on the helicopter had the corresponding Supplemental Type Certificate (STC) approved by Spain's Civil Aviation General Directorate in September 2002. The system's design was covered by the EASA Supplemental Type Certificate IM.R.S. 0078 Revision 1, validated by the EASA.

This firefighting system consists of a belly tank housed underneath the helicopter for storing water that is drawn in by a suction pump located at the end of a 3.68 m long hose.

For water drops, the bottom of the tank has two doors that the crew can open one by one to discharge the water in two drops, or in a single drop if both doors are opened at the same time.

There was a rearview mirror in the right front of the helicopter used by the pilot during water loading and offloading operations.

1.5. Meteorological information

The crew reported turbulent and highly variable winds gusting between 15 and 25 kt. There were scattered clouds with intermittent rain and a temperature of 25° C. Visibility was affected by the smoke from the fire.

Spain's national weather agency reported several lightning strikes in the area at the time of the accident, indicative of the presence of vertically developed convective clouds near the scene.

1.6. Information on the area affected by the fire

The fire was burning shrubs and dry grass measuring some 50-cm tall, resulting in few flames but producing abundant smoke. It was on the west face of the Pregón Ravine, with the fire line located halfway down the slope.

Firefighters were combatting the fire using fire swatters², more or less moving along the fire line in a south-north direction on the right flank of the fire.

On the accident drop and on the preceding one, the helicopter loaded water at a pool in the town of Guils de Cerdanya, located NE (Northeast) of the fire and two kilometers away. On these last two drops the helicopter worked in concert with the firefighting squad mentioned earlier. The fleet tracking equipment used by the regional government of Catalonia was used to determine the flight path taken by the helicopter from the town and the fire, as shown in Figure 2.

The helicopter was flying over very positively sloped terrain just prior to the water drop.

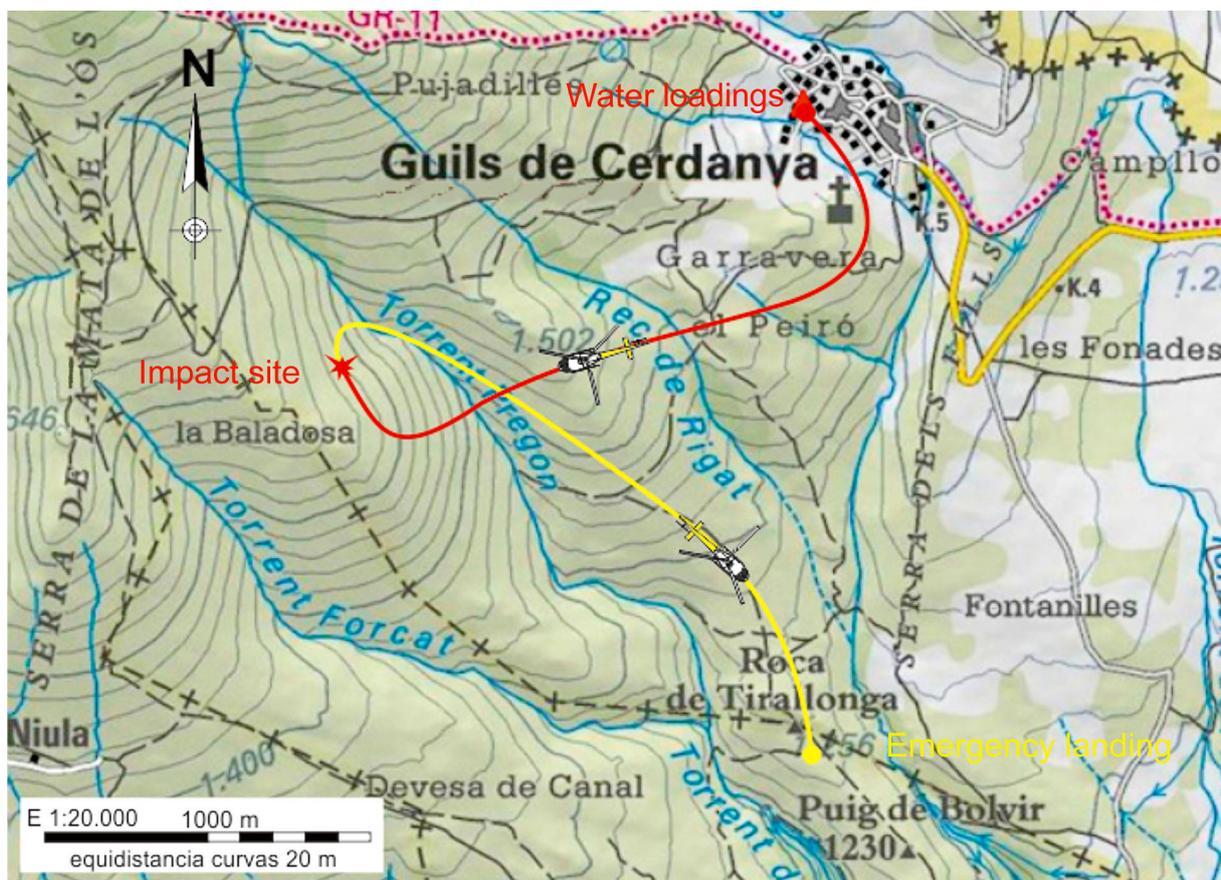


Figure 2. Route taken on last water drop and water loading, impact and landing sites

² A fire swatter is a tool that puts out a fire by suffocating it (depriving it of air). It has a wood or metal shaft fitted with a temperature resistant elastic shovel at one end.
http://www.magrama.gob.es/es/biodiversidad/publicaciones/eqcompher_tcm7-19419.pdf

1.7. Tests and research

Crew statements:

Pilot

The pilot reported being at the controls of the helicopter and informed the flight operator that the flyover would be at a low altitude so as to cool down the area for the advancing firefighters, and also that they would make two drops.

The flyover was in a south-north direction at a ground speed of between 20 and 25 kt and constant altitude. The visibility was affected by the smoke.

They made the first water drop and approximately two seconds later they heard an impact noise and felt a shudder, after which the helicopter started vibrating with low intensity in both the vertical and horizontal directions.

The helicopter was controllable. The pilot flew it for about thirty seconds before making an emergency landing in a safe area.

Flight operator

The flight operator stated that he did not see any obstacles that would hinder the flight at the start of the last flyover, and that his mission was to monitor the engine instruments and to open one or both belly tank doors as specified by the pilot by operating a switch on the instrument panel.

Instants after making the first drop he heard a noise and felt a jolt. The helicopter then started to vibrate. He initially checked the power and rotor readings and continued monitoring them until they landed, informing the pilot that everything was normal.

Neither crewmember was able to provide any details regarding the type of obstacle impacted by the suction pump on the ground that could have shook the helicopter or pushed the pump up and strike the helicopter.

1.8. Organizational and management information

1.8.1. *Operations Manual*

The Operations Manual (OM) describes the “flight operator” as a non-licensed auxiliary crewmember who has received the training described in Section D of said manual. This

crewmember's responsibilities, according to the OM, include providing support to the captain during firefighting missions.

The minimum crew required by the OM on firefighting missions with an attached tank is one pilot and one flight operator.

1.8.2. *Actions taken by the helicopter operator*

The Operations Department of the operator issued an internal memo seven days after the accident in which it stressed the need to exercise extreme caution in terms of the clearance between the firefighting system's suction pump and the height of obstacles both when taking off and when doing flyovers to drop water. The minimum safety distance between the pump and any obstacle shall be fifty feet.

The company's Technical Commission on Flight Safety issued a Flight Safety Report on 24 August on the accident and on a previous incident in which another helicopter had struck some trees with its suction pump, resulting in slight damage to its tail-boom.

Both events were determined to have occurred when the suction pump struck vegetation.

A proposal was made to remind crews during refresher training to monitor the location of the suction pump, which is the lowest part on the helicopter, through the curtain of water after making water drops.

A proposal was also made to have every pilot involved in emergency operations attend a training session on cockpit risk management to review and discuss operationally risky procedures and situational awareness.

1.9. **Additional information**

Similar event:

On 22 June 2009, an AS-350 B3 helicopter fitted with the Simplex Fire Attack System, Model 320, crashed to the ground when both main rotor blades broke in flight due to being struck by the suction pump on the firefighting system and by a stone hanging from a sling that was sucked into and got tangled up in said pump.

The final report on this accident³ included two safety recommendations, one for the manufacturer of the firefighting system and another for AESA and the FAA, as the

³ http://www.fomento.gob.es/NR/rdonlyres/E952A2FA-84AC-46FF-BE9A-B8AD608D2C23/112552/2009_011_A_ENG.pdf.

certifying authorities for said system, intended to modify the design and to establish the mechanisms necessary to release the hose and the suction pump from the aircraft in the event these components are inadvertently hooked on some obstacle.

2. ANALYSIS AND CONCLUSIONS

The helicopter, with the minimum crew required by the OM for operating with the Simplex 310 firefighting system, was taking part in firefighting efforts against a fire that was burning shrubs, grass and some scattered trees.

During its last drop the helicopter was flying over a sharply rising hillside. The smoke from the fire reduced the visibility in the area of the water drop. According to the information provided by the crew, the helicopter maintained a constant altitude from the start of the drop and became unstable just two seconds after the first partial water drop, when the crew felt a shudder and heard what sounded like an impact before the aircraft started vibrating.

The helicopter's instability, described by the crew as a jolt, could have been caused by the suction pump being momentarily hooked on a physical obstacle, perhaps one of the few scattered trees in the area or a shrub. The impact noise heard by the crew could have coincided with the uncontrolled oscillatory motion of the assembly consisting of the suction pump and the hose as they struck various parts of the helicopter before finally coming to a rest atop the engine exhaust nozzle.

The impact and the momentary retention of the suction pump on an obstacle near the ground is considered to have caused said pump and fill hose to swing up and strike the main rotor blades and helicopter frame, forcing the pilot to execute an emergency landing.

The failure of the crew to see the obstacle could have been due to the decreased frontal visibility as a result of the smoke in the air. Another possible reason is that the crew, once lined up on the flyover heading, focused its attention inside the cockpit, on the water drop point and on monitoring the drop in the mirror, and failing to notice the proximity of the ground behind the curtain of water to the suction pump hanging below the helicopter.

The actions taken by the helicopter operator intended to maintain proper clearance between the ground and the suction pump hanging beneath the helicopter are believed to be sufficient to improve flight safety during operations involving the Simplex 310 firefighting system installed on the helicopter.