Australian Government
Australian Transport Safety Bureau

Collision with terrain involving AS350, VH-EWM

31 km WSW of Hobart, Tasmania, 7 February 2013

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Addendum

Page	Change	Date

Collision with terrain, involving AS350, VH-EWM

What happened

On 7 February, 2013 at about 1655 Eastern Daylight-saving Time[1] a Eurocopter AS350 B2 helicopter[2], registered VH-EWM (EWM) was conducting water-bombing operations near Hobart, Tasmania, when it collided with terrain (Figures 1 and 2). The pilot, the sole person on board, suffered minor injuries and the helicopter sustained substantial damage.

A Bambi bucket

Source: SEI Industries Ltd website

EWM was one of a group of helicopters involved in mitigation of a large bushfire about 31 km west-south-west of Hobart, Tasmania. At about 1030 that morning, the pilot departed from Cambridge airport to the forward staging area on the Molesworth oval (Figure 1). EWM was one of four helicopters tasked to work on spot fires ahead of the main fire front. The four pilots arranged the spot-fire water-bombing runs between themselves.

The helicopter had been uploading water from a small dam, using a Bambi bucket suspended on a 50ft line (see picture inset). The pilot dumped the water onto spot-fires, and then returned to the dam to upload more water. This routine had continued throughout the day, with the pilot having a couple of rest breaks during refuelling stops.

The particular spot fire EWM was working on was not particularly large, but was on a downhill slope and in a gully. The pilot reported that the overall wind was north-north-westerly, but the fire created a localised westerly in-draft, within the gully. He had just uploaded water from the dam, south-east of the accident site, and was manoeuvring to have the nose of the helicopter slightly off to the left of the local wind.

The pilot slowed EWM in preparation of making the next water drop. Approaching the hover at about 80 ft above ground level, and immediately following the loss of translational lift [3] (TL), the helicopter suddenly commenced an uncommanded left yaw and descent. Without any warnings or alarms, the helicopter rotated rapidly 2-3 times to the left. The pilot raised the collective to decrease the rate of descent, and countered the yaw with anti-torque pedal input; however the rate of yaw increased. The pilot reported that “in a very short period of time” the helicopter was in the trees. The speed of events did not give the pilot time to dump the Bambi bucket, release the water, or broadcast a Mayday call. The helicopter came down in the upright position but when close to the ground, it rolled to the left, about 130° from the vertical (Figure 2).

After coming to rest, the pilot undid his seatbelt, turned off the fuel and master switches and exited the helicopter taking the survival kit. The pilot had landed about 20-30 metres from the spot-fire and less than 100 metres from the main fire front.

One of the remaining three pilots broadcast that EWM had collided with terrain. Another pilot from the group, flying a Bell 212, registered VH-NEN, heard the broadcast, and quickly flew to the accident site, and emptied water on the spot fires near the pilot. He also relayed the details and Global Positioning System (GPS) position to the Incident Management Team (IMT) in Cambridge.

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1 Eastern Daylight-saving Time (EDT) was Coordinated Universal Time (UTC) + 11 hours.

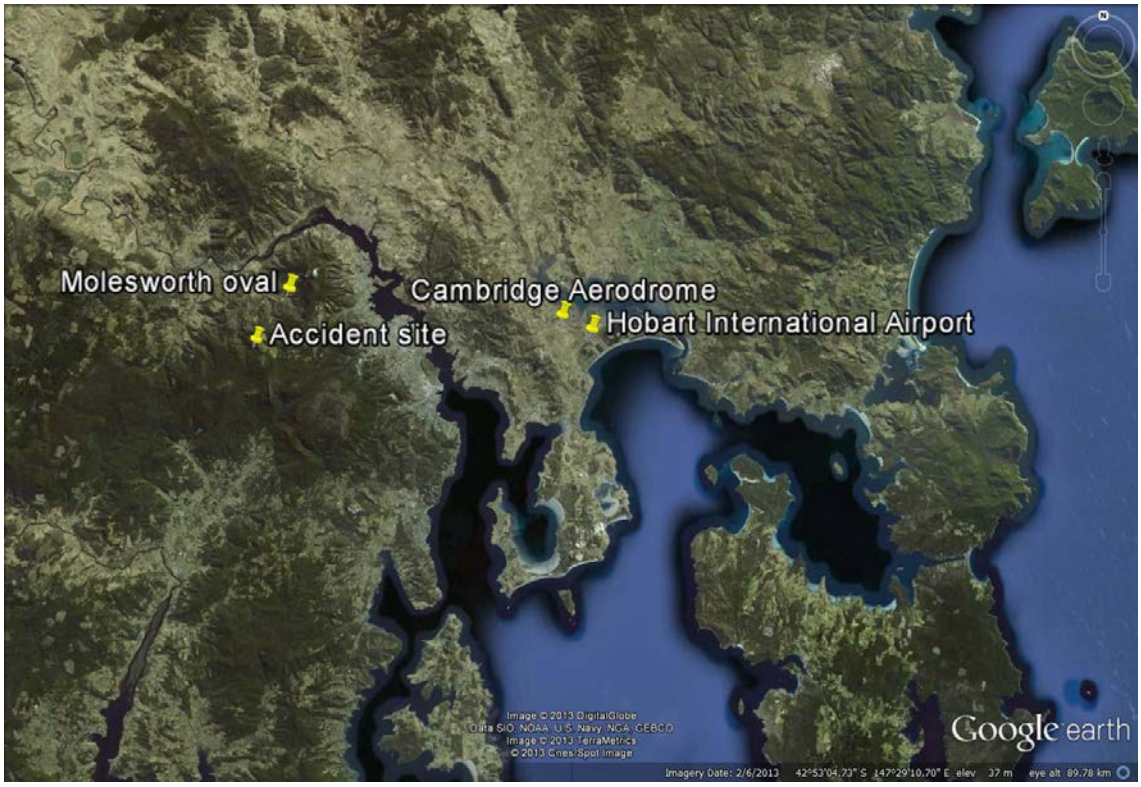
2 VH-EWM had been converted to an AS350 SD2 by Soloy, with the replacement of the engine with a Honeywell LTS101-700D2 engine under a FAA approved supplemental type certificate (SR01647SE)

3 Additional lift gained by helicopter in horizontal flight resulting from a reduction in induced airflow through main rotor(s) gained from forward airspeed.

He requested the immediate assistance of a rescue helicopter to extract the pilot of EWM, given the proximity of the fire to the downed pilot. While waiting for the arrival of the rescue helicopter, NEN and the remaining two helicopters continued to drop water around the area of the crashed helicopter and its pilot.

In a few minutes, it became apparent that the pilot of EWM was in imminent danger, and with the rescue helicopter still some time off, the pilot of NEN positioned the Fast bucket[4], on a 100 ft line next to the downed pilot. The pilot climbed into the bucket and was lifted to a nearby fire service tanker and taken to hospital.

Figure 1: Satellite view of accident site and Cambridge aerodrome



Source: Google earth

Experience and comments of PIC of EWM

The pilot held a European Air Transport Pilot (Helicopter) Licence, and an Australian Commercial Pilot (Helicopter) Licence with approximately 4,100 hours total time. This included 1,557 hours on the AS350, and 328 hours in sling operations. This was the pilot's first season involved in water bombing operations, but as it had been a busy fire season in Tasmania, he had been involved in water bombing, airborne reconnaissance, mapping and infrared scan activity. At the beginning of the fire season, the pilot had been trained in water-bombing techniques by the company base manager / acting chief pilot.

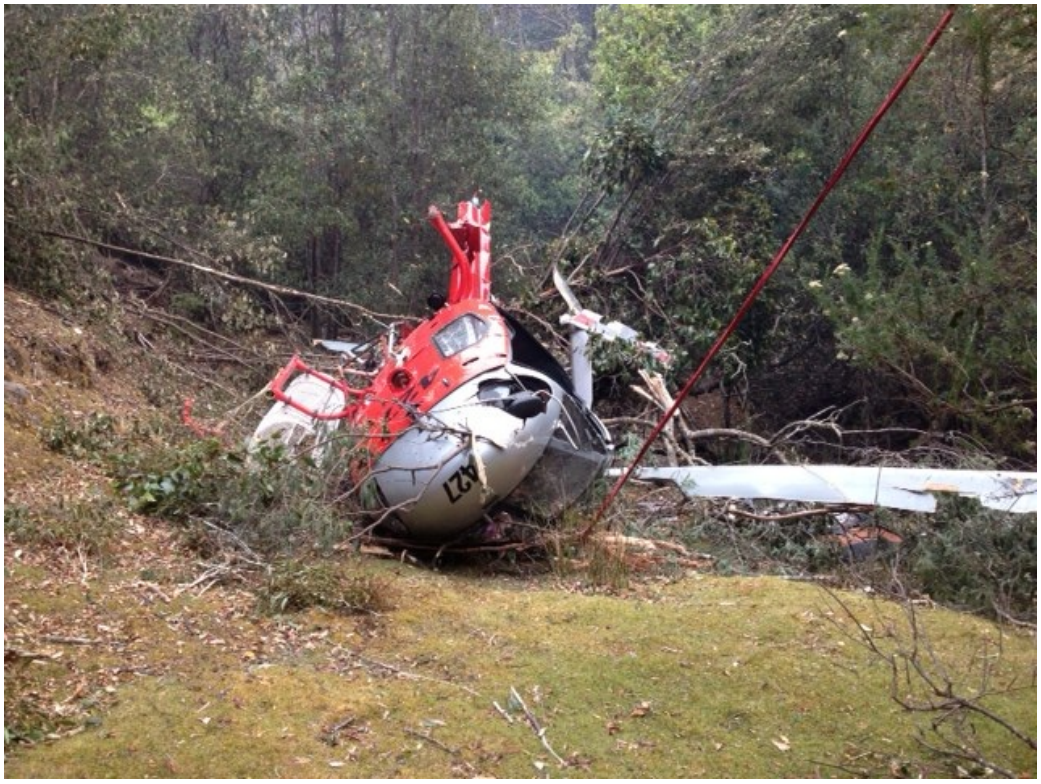
The pilot reported that no specific briefing was given to the helicopter pilots on the accident day, although a map was used to detail where they were to be deployed.

The pilot reported that another pilot flying EWM on 5 February, two days before the accident, could not obtain full power from the helicopter and consequently the fuel filter had been replaced by a Licensed Aircraft Maintenance Engineer. The pilot also reported that he checked the performance of the helicopter after departing Cambridge enroute to the fire, and noted that the governor was slow to control the main rotor RPM.

[4] The Fast bucket is a different shape, size and functionality to the Bambi bucket.

Following the accident when egressing from the helicopter, the pilot reported that he noted that the engine was not running.

Figure 2: VH-EWM at the accident site



Source: Supplied by Simon Taylor

VH-EWM

VH-EWM had been converted to an AS350 SD2 by Soloy, and fitted with a Honeywell LTS101-700D2 engine under an FAA approved supplementary type certificate. The helicopter was on cross-hire from a Queensland company, and was in support of a contract the operator had with the Fire Service of Tasmania.

The maintenance release current at the time of the accident, showed the helicopter had 2,041.8 hours total time, and had completed a 50 hourly engine inspection at 2,004 hours. The maintenance release was endorsed with a requirement at 2,004 hours for the pilot to carry out a power check and to contact the engineers. That endorsement had been signed off as completed.

Recent maintenance

The following maintenance had been carried out on EWM in the previous four weeks.

- 15 January – Engine power check conducted, and found satisfactory, although the Rotor RPM (Nr) was low and was adjusted.
- 22 January – Fuel filler boot replaced, Nr[5] adjusted again and auto Nr (low pitch stops) adjusted
- 1 February – Torque meter[6] was found to be over reading by 11% and was adjusted and a power check performed
- 5 February – Following illumination of the fuel filter light, the engine fuel filter was replaced, airframe fuel filter replaced and drum pump fuel filter replaced.

[5] Main Rotor RPM

[6] Instrument for measuring torque in a turbine engine, usually oil-pressure system sensing axial load

Following reports of two accidents where LTS 101 engines suddenly lost power, the Federal Aviation Administration (FAA) in November 2011 issued an Airworthiness Directive (AD) (2011-23-13 Honeywell International Inc) requiring the initial replacements of certain power turbine governor (PTG's) spool bearings and thereafter replacement every 900 hours. This AD had been complied with on EWM, approximately 200 hours prior to the accident.

Meteorological information

Area forecast (ARFOR)

In order to facilitate the provision of aviation weather forecasts by the Bureau of Meteorology (BoM), Australia, is divided into a number of forecast areas. The accident site is situated in Area 70. The Area 70 ARFOR, valid from 1600 on 7 February 2013 to 0400 on 8 February 2013 included:

- A front stretching from approaching from the SW, with severe turbulence lee of the ranges below 8000 ft
- Wind from the north-west at 35 knots at 2000 ft

Aerodrome terminal area forecast (TAF)

- The latest amended TAF for Hobart, 31 km to the east, covering ther period 1700 on 7 February 2013, to 1100 on 8 February 2013 included:
- Wind from 150° (True) at 15 knots, gusting to 25 knots,forecast to be changing to 320°T at ten knots from 1800
- Moderate turbulence forecast below 5000 ft from 2300.

The pilot of EWM reported that the winds had dropped in intensity, prior to the accident, and were not reflective of the area forecast or nearby Hobart TAF.

Comments of PIC of NEN (rescue helicopter)

The pilot commented that during the accident day, there was significant fire activity, making conditions through both the smoke and terrain very challenging. He reported that due to the fire activity, the twenty knot northerly winds were 'aggressive' with gusts of up to 30 knots.

He used a 1,500 L Fast water bucket attached to a 100 ft long line, to drop loads of water around the crash site, and the pilot whom he could see had exited the helicopter. He did not know the extent of the pilot's injuries, but could see the imminent danger from the fast approaching main fire front. The other pilots made the decision that the Bell 212, being a twin-engine helicopter with a 100 ft line and a Fast bucket, would be the most suitable for the rescue.

Operator comment

The operator completed an investigation of the crash site, and interviewed the pilot in command. After collating this information, coupled with the environmental and flying conditions both prior to and during the accident sequence, they suggested the helicopter may have experienced settling with power.

Comment from the Bureau d'Enquêtes et d'Analyses pour la sécurité de l'Aviation Civile) (BEA)

BEA noted that if the uncommanded descent could be associated with vortex ring phenomenon or a loss of power, the left yaw could not have been triggered by one of them. They added that the left yaw could be explained by a loss of the tail rotor effectiveness (LTE).

ATSB comment

As the ATSB did not attend the accident site, or examine the helicopter, the reason for the accident could not be conclusively established. The described behaviour of the helicopter by the

pilot was consistent with Loss of Tail rotor Effectiveness (LTE). In this condition of flight, the tail rotor loses aerodynamic efficiency. Factors which contribute are:

- Low airspeed
- High power
- An adverse relative wind

The area forecast had several amendments throughout the day, as did the TAF for Hobart. With the combination of an approaching front, a large main fire-front and rugged, hilly, terrain, it is expected that the wind near the accident site would have been constantly changing.

Water-bombing helicopters operate at very low altitudes, in very challenging and often rapidly changing conditions. Any sudden onset of an abnormal condition of flight presents negligible time for recovery.

Eurocopter circulated Service Letter No 1673-67-04 in 2005 regarding the yaw axis control features for all helicopters under certain flight conditions. The link is available at:

www.eurocopter.com/site/docs_wsw/RUB_36/1673-67-04en.pdf

Safety message

Courses are available for those involved in support roles in bushfire fighting activities. Information on a Basic Wildfire Awareness is available from the Australian Fire and Emergency Service Authorities Council at:

www.afac.com.au/services/training/awareness

General details

Manufacturer and model:	Eurocopter AS350B2 converted to an AS350 SD2 by Soloy	
Registration:	VH-EWM	
Type of operation:	Aerial Work – Fire Control	
Occurrence category:	Accident	
Primary occurrence type:	Collision with terrain	
Location:	31 km WSW of Hobart Airport, Tasmania	
	Latitude: 42° 50.88' S	Longitude: 147° 07.62' E
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – 1 (minor)	Passengers – Nil
Damage:	Substantial	

About the ATSB

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; and fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A

primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.