

No: 10/83

Ref: EW/C 831

Aircraft type and registration:	Bell 47G 3BI G-BGAI (light single engine helicopter)
Year of manufacture:	1964
Date and time (GMT):	4 June 1983 at 1855 hrs
Location:	Wappenham, Towcester, Northants
Type of flight:	Aerial application (TILT 250 EC Fungicide)
Persons on board:	Crew - 1 Passengers - Nil
Injuries:	Crew - 1 (serious) Passengers - N/A
Nature of damage:	Aircraft destroyed
Commander's Licence:	Commercial Pilot's Licence (Helicopters) Private Pilots Licence (fixed wing)
Commander's Age:	20 years
Commander's total flying experience:	1080 hours (of which 70 hours are on type and 265 hours are on fixed wing aircraft)

The helicopter was fitted with Simplex spray equipment and was treating a field of corn which was approximately 3 feet tall. The aircraft had completed a wingover type manoeuvre at the end of the first spray run. During or shortly after the recovery from this manoeuvre, when beginning a second run, the pilot heard the main rotor RPM decay. From the normal spraying height of 3 - 4 feet above the crop the helicopter sank into the crop, pitched nose down, and came to rest inverted. The pilot's four point harness was found fully secured to the aircraft, and the pilot did not sustain any significant injury as a result of the impact. However, fuel spillage resulted in a small fire, and the pilot suffered severe burns to both legs.

Examination indicated that the fuel release occurred when the fuel tank separated from the aircraft ruptured during its inversion, although the tank was not ruptured and a number of design features aimed at ensuring a high standard of fuel system crashworthiness were provided. These included a break-away self-sealing coupling at each of the three tank outlets, namely supply, drain and vent. However, the vent system break-away coupling failed to operate when an adjacent rubber hose forming a connection in the rigid vent piping failed in preference, leaving the tank vent outlet unsealed. It was noted that similar features were also incorporated in the tank drain line.

In addition, a failure occurred in the bolt fastening the flip-top type tank filler cap. An approximately 0.1 in diameter pin retaining the knurled head to the bolt shank was found sheared, consistent with the effects of pin overload by fuel surge forces on the inside surface of the filler cap during the impact sequence, in spite of the fact that impact forces were clearly relatively low. The cap was thus free to open on its hinge.

It was likely that the pilot's burns resulted from fuel thrown out of the open filler and/or the unsealed vent. Tank orientation after coming to rest was fortunately such that the tank could retain a considerable quantity of fuel (approximately 11 imp/gal) without spillage from the unfastened filler and/or the unsealed vent.

Examination of the aircraft and its powerplant did not reveal evidence of pre-impact failure or malfunction.