



No. 95-018

Fletcher FU 24-954

ZK-EUG

18 nm North of Wairoa

1 November 1995

Abstract

On Wednesday 1 November 1995, Fletcher FU24 ZK-EUG collided with the terrain during topdressing operations on Rongoio Station, 18 nm north of Wairoa. An intense fire ensued and the pilot lost his life in the accident. In-flight incapacitation of the pilot was identified as the probable cause. A safety recommendation pertaining to medical advice was made to the Aviation Industry Association.

Transport Accident Investigation Commission

Aircraft Accident Report No. 95-018

Aircraft type, serial number and registration:	Fletcher FU 24-954, 284, ZK-EUG
Number and type of engines:	1 Lycoming IO-720-A1B
Year of manufacture:	1982
Date and time:	1 November 1995, 1020 hours ¹ (approx)
Location:	Rongoio Station, 18 nm north of Wairoa Latitude: 38° 44.1' S Longitude: 177° 29.8'E
Type of flight:	Aerial Work - Agricultural (topdressing)
Persons on board:	Crew: 1
Injuries:	Crew: 1 Fatal
Nature of damage:	Aircraft destroyed
Pilot-in-Command's Licence:	Commercial Pilot Licence (Aeroplane)
Pilot-in-Command's age:	41
Pilot-in-Command's total flying experience:	10 000 hours (approximately) 8500 on type
Information sources:	Transport Accident Investigation Commission field investigation
Investigator in Charge:	A J Buckingham

¹ All times in this report are NZDT (UTC+13).

1. Factual Information

- 1.1 At about 0730 hours on Wednesday 1 November 1995, the pilot, with his loader driver, departed from Wairoa Aerodrome in ZK-EUG for the St Leger airstrip, 18 nm to the north. The planned operation for the day was the sowing of superphosphate on nearby Rongoio Station.
- 1.2 On arrival at the strip, the pilot checked and greased the loading vehicle, and his first take-off on the sowing operation was about 0815 hours. The loader driver commented that he was surprised that the pilot had checked over the loading vehicle, rather than leave it to him. He also observed that the pilot seemed “fairly relaxed”, and was in “no great rush” to start the actual job.
- 1.3 After a few sowing runs had been completed, the station owner arrived at the airstrip and went on a reconnaissance flight with the pilot. The job then continued normally, although a rain shower caused a temporary halt at one stage. The weather was generally overcast, with intermittent rain and light winds.
- 1.4 Each sortie took some five minutes, and at about 1020 hours, when the aeroplane had not returned from the sowing area, the loader driver became concerned. He flagged down the next passing vehicle on nearby Ruakaka Road, and asked the occupants to go to the nearest farmhouse and telephone Gisborne Tower to report that the aeroplane was missing. This was done, and the call was received by Gisborne Tower at 1040 hours.
- 1.5 The station owner, after his flight, had driven to another part of his property to work, and from this point he had been able to see the aeroplane as it made its way to the sowing area. The pilot was sowing the lower slopes with part of the load and continuing to the higher country with the lightened aircraft to sow the remainder of the load. On one sortie, the station owner saw the aeroplane disappear from sight en route to the higher ground, but did not see it return.
- 1.6 Shortly afterward, the station owner noticed smoke rising from a gully near the boundary of the neighbouring property and decided to investigate, not associating the smoke with the aircraft at first. Arriving at the gully, he found the aircraft wreckage burning fiercely, recognised that the pilot had no chance of survival, and made his way home to report the accident. On his way, he met his wife and the wife of the neighbouring station owner, who were on their way up to look for the aircraft.
- 1.7 He gave them directions to the wreckage and continued home. The wives, one of whom was a Registered Nurse, located the wreckage and confirmed that the pilot had died in the accident.
- 1.8 Examination of the wreckage showed that the aeroplane had struck the ground with its left wingtip while banked to the left at least 45°. In this attitude, the aeroplane had been flying with its wings approximately parallel to the slope of the right hand side of the gully, and was well down inside the gully in a position where, according to the station owner, the pilot would not normally have flown. The wreckage was almost vertically beneath the Tuai - Gisborne power line, the line crossing above the point of first ground contact at a height of 39 m.
- 1.9 The outer section of the left wing separated on contact with the ground, and the aeroplane slewed to the left through approximately 270°, coming to rest against a large totara log. The right wing had detached at the root fittings, and lay parallel to the fuselage, and the inner section of the left wing had become detached and lay inverted close to its normal position.

- 1.10 The nature of the fire evidence indicated that there had been sufficient fuel on board to initiate and sustain an intense fire in the area embracing the cockpit, fuel tanks and hopper. Most of the non-ferrous components in these areas had been reduced to ash.
- 1.11 The propeller had struck the ground 22 m from the final location of the wreckage, leaving deep slash marks in the soil, and separating from the crankshaft in the process. The depth and spacing of the slash marks indicated that considerable engine power was being developed at impact. Calculations based on the spacing of the propeller slash marks and the assumption that maximum rpm were being developed yielded a groundspeed range of 50 to 55 knots.
- 1.12 Within the limits imposed by the severe fire damage, control integrity was able to be established, but little other useful information could be gleaned. The engine had separated from the airframe, but had come to rest inverted in approximately the normal position in relation to the firewall, and was partially destroyed by burning. A 50 m trail of superphosphate, consistent with the pilot's jettisoning of the remaining hopper contents, overlaid the wreckage trail. A minor strike mark on a small manuka bush was found at about the same point as the commencement of the superphosphate trail.
- 1.13 As no rational explanation for the presence of the aircraft so low down in the gully could be determined, a thorough search of the gully was conducted, looking in particular for strike marks on other trees or the ground. Nothing of relevance was found, nor was there any evidence that the aircraft had struck the conductors of the power line overhead. The station owner said that the pilot had topdressed the property four times previously, and in the area of the accident, had always operated above the level of the power line. Higher in the gully, fresh superphosphate was found, the pattern of distribution indicating that sowing had been normal in that location.

Pilot information

- 1.14 The pilot, male, aged 41, held a Commercial Pilot Licence (Aeroplane) and an Agricultural Rating. His most recent Class 1 Medical Certificate had expired on 27 September 1995, and at the time of the accident, he had not undergone a renewal medical examination. His last electrocardiogram (ECG) had been performed on 23 March 1995 and showed no abnormality.
- 1.15 He had been employed as an agricultural pilot for some 14 years and had flown about 9700 hours in that role. He had flown 286 hours in the 90 days preceding the accident.
- 1.16 The pilot had taken leave between 14 and 19 September 1995 and again between 23 September and 4 October 1995. A relief pilot continued the operation during those periods.
- 1.17 The reason for the pilot's failure to undergo a renewal medical examination could not be determined, but the most likely explanation appeared to be that he had simply forgotten that it had fallen due.

Medical and Pathological Information

- 1.18 Despite the difficulties imposed by the severe burn damage to the pilot's body, post-mortem examination found that he had suffered an acute myocardial infarction; specifically, the dominant right coronary artery was blocked by a significant clot (thrombus). Medical opinion was that there was sufficient obstruction to have caused chest pain, loss of blood pumping action of the heart resulting in acute shock, with consequent partial or complete loss of consciousness. The onset of symptoms would have been rapid, preventing the pilot from maintaining situational awareness or control of the aircraft.

- 1.19 Previous routine medical examinations of the pilot (annually up to his 40th birthday and six-monthly thereafter) did not identify any disease or risk factor that would have led to an increased risk of coronary artery disease, and the post mortem examination found only a small area of arterial wall damage in the vicinity of the thrombus. There was no other coronary artery disease present.

2. Analysis

- 2.1 The position of the aircraft in the gully, together with evidence of low airspeed and a high power setting, was not consistent with normal operation or the pilot's past sowing pattern in that area. The site evidence suggested that the aircraft had been descending into the gully, possibly at a low power setting, and immediately before the first ground strike, the pilot had applied power and banked steeply to the left, jettisoning the remaining hopper load at the same time.

- 2.2 Post-mortem examination found that the pilot had suffered an acute cardiac event, the effects of which were likely to be severe pain, acute shock and at least partial loss of consciousness. This could have been sufficient for him to lose situational awareness and control of the aeroplane. Thus the abnormal location can be explained, but the jettisoning of the hopper contents immediately prior to impact was a conscious act, suggesting that the pilot retained (or regained) his faculties sufficiently to realise the imminent danger, and reacted accordingly. However, by this time, the aircraft was in a position from where it was not possible to make a successful recovery, and collision with the ground followed.

Medical aspects

- 2.3 Coronary thrombosis in this case was an extremely acute (sudden) event, occurring in an individual with minimal coronary artery disease. As a result, routine medical screening tests would have failed to detect any such small abnormality. As the major changes in heart function occurred immediately prior to death (as occurs in 25% of cases of myocardial infarction), there would be no means of predicting such changes by additional medical examination procedures, with the exception of coronary angiography. Such an invasive and risky procedure is not recommended for routine screening of aircrew for medical certification.
- 2.4 Arterial disease is common in the adult male population and minor changes in some part of the cardiovascular system are almost universal. These changes are usually minor and in non-critical areas such as the aorta (in wider blood vessels, small changes in diameter will have very little effect on blood flow). The risk factors for developing artery disease (family history, smoking, gender, age, cholesterol) predict the possibility that disease will develop, namely how many abnormal areas would arise and how severe or progressive the changes might be. However, there is a non-specific element to the development of local arterial abnormalities, and in this case the pilot was affected by a severe abnormality in a critical area. This development would not have been predicted by the normal risk factors.
- 2.5 Routine medical testing includes resting electrocardiography, which is acknowledged to produce false negative results in the presence of significant arterial disease. Alternative methods of testing (stress ECG, heart scans) are more invasive and their value is limited by a high false positive rate. Routine use of these tests in non-symptomatic aircrew is only justified on the basis of excessive artery disease risk indicated on the basis of risk factors and clinical examination findings. These were not present according to this pilot's medical records.

3. Findings

- 3.1 The pilot was appropriately licensed, rated and experienced for the agricultural operation.
- 3.2 The pilot's Class 1 medical certificate had expired, and he had not undergone a renewal medical examination prior to the accident.
- 3.3 The probable reason for his failure to undergo a renewal medical examination was that he had forgotten the due date.
- 3.4 The pilot suffered an acute myocardial infarction while in flight.
- 3.5 The effects of the myocardial infarction probably led initially to loss of situational awareness and loss of control of the aircraft.
- 3.6 The pilot may have realised at a late stage that a collision with the ground was imminent, but was unable to recover from the situation in time to avoid it.
- 3.7 The nature of the cardiac event was such that no warning of it would have been detectable at a routine pilot medical examination.
- 3.8 The aeroplane was capable of normal operation up to the time of the accident.

4. Safety Recommendation

- 4.1 As a result of the investigation of this and a previous similar accident (see Report No. 95-010) it was recommended to the Agricultural Division Committee of the Aviation Industry Association of New Zealand that they:

Promote a health education programme, based on suitable medical advice, which would assist their members to reduce the incidence of cardiovascular disease among agricultural pilots and assist in its prompt detection. (007/96)

- 4.2 The Agricultural Division Committee of the Aviation Industry Association of New Zealand responded as follows:

The Division has no specific comment to make on the wording or focus of the recommendation. In doing so it should be noted that while both accidents highlighted the presence of health problems in the pilots concerned this was probably coincidental and in no way suggests the existence of a major problem within the agricultural aviation fraternity at large. The Aviation Industry Association (AIA) and its Agricultural Aviation Division, the NZ Agricultural Aviation Association (NZAAA) particularly, maintain the view that all aviation personnel should maintain a good and healthy lifestyle and are encouraged to do so.

17 April 1996

M F Dunphy
Chief Commissioner

Glossary of Aviation Abbreviations

AD	Airworthiness Directive
ADF	Automatic direction-finding equipment
agl	Above ground level
AI	Attitude indicator
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
amsl	Above mean sea level
AOD	Aft of datum
ASI	Airspeed indicator
ATA	Actual time of arrival
ATC	Air Traffic Control
ATD	Actual time of departure
ATPL (A or H)	Airline Transport Pilot Licence (Aeroplane or Helicopter)
AUW	All-up weight
°C	Degrees Celsius
CAA	Civil Aviation Authority
CASO	Civil Aviation Safety Order
CFI	Chief Flying Instructor
C of A	Certificate of Airworthiness
C of G (or CG)	Centre of gravity
CPL (A or H)	Commercial Pilot Licence (Aeroplane or Helicopter)
DME	Distance measuring equipment
E	East
ELT	Emergency location transmitter
ERC	Enroute chart
ETA	Estimated time of arrival
ETD	Estimated time of departure
°F	Degrees Fahrenheit
FAA	Federal Aviation Administration (United States)
FL	Flight level
ft	Foot/feet
g	Acceleration due to gravity
GPS	Global Positioning System
h	Hour
HF	High frequency
hPa	Hectopascals
hrs	Hours
IAS	Indicated airspeed
IFR	Instrument Flight Rules
IGE	In ground effect
ILS	Instrument landing system
IMC	Instrument meteorological conditions
in	Inch(es)
ins Hg	Inches of mercury

kg	Kilogram(s)
kHz	Kilohertz
KIAS	Knots indicated airspeed
km	Kilometre(s)
kt	Knot(s)
LAME	Licensed Aircraft Maintenance Engineer
lb	Pounds
LF	Low frequency
LLZ	Localiser
Ltd	Limited
m	Metre(s)
M	Mach number (e.g. M1.2)
°M	Degrees Magnetic
MAANZ	Microlight Aircraft Association of New Zealand
MAP	Manifold absolute pressure (measured in inches of mercury)
MAUW	Maximum all-up weight
METAR	Aviation routine weather report (in aeronautical meteorological code)
MF	Medium frequency
MHz	Megahertz
mm	Millimetre(s)
mph	Miles per hour
N	North
NDB	Non-directional radio beacon
nm	Nautical mile
NOTAM	Notice to Airmen
NTSB	National Transportation Safety Board (United States)
NZAACA	New Zealand Amateur Aircraft Constructors Association
NZDT	New Zealand daylight time (UTC + 13 hours)
NZGA	New Zealand Gliding Association
NZHGPA	New Zealand Hang Gliding and Paragliding Association
NZMS	New Zealand Mapping Service map series number
NZST	New Zealand Standard Time (UTC + 12 hours)
OGE	Out of ground effect
okta	Eighths of sky cloud cover (e.g. 4 oktas = 4/8 of cloud cover)
PAR	Precision approach radar
PIC	Pilot in command
PPL (A or H)	Private Pilot Licence (Aeroplane or Helicopter)
psi	Pounds per square inch
QFE	An altimeter subscale setting to obtain height above aerodrome
QNH	An altimeter subscale setting to obtain elevation above mean sea level
RNZAC	Royal New Zealand Aero Club
RNZAF	Royal New Zealand Air Force
rpm	revolutions per minute
RTF	Radio telephone or radio telephony

s	Second(s)
S	South
SAR	Search and Rescue
SSR	Secondary surveillance radar
°T	Degrees True
TACAN	Tactical Air Navigation aid
TAF	Aerodrome forecast
TAS	True airspeed
UHF	Ultra high frequency
UTC	Coordinated Universal Time
VASIS	Visual approach slope indicator system
VFG	Visual Flight Guide
VFR	Visual flight rules
VHF	Very high frequency
VMC	Visual meteorological conditions
VOR	VHF omnidirectional radio range
VORTAC	VOR and TACAN combined
VTC	Visual terminal chart
W	West