

AIRCRAFT ACCIDENT REPORT
OCCURRENCE NUMBER 12/5532
NZ AEROSPACE FU24A-954
ZK-EMX
WAIKITE VALLEY, ROTORUA
8 DECEMBER 2012



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Foreword

CAA may investigate subject to Section 72B(2)(d) of the CAA Act which prescribes the following:

72B Functions of Authority

(2) The Authority has the following functions:

- (d) To investigate and review civil aviation accidents and incidents in its capacity as the responsible safety and security authority, subject to the limitations set out in section [14\(3\)](#) of the [Transport Accident Investigation Commission Act 1990](#)

The purpose of a CAA investigation is to determine the circumstances and identify contributory factors of an accident or incident with the purpose of minimising or reducing the risk, to an acceptable level, of a similar occurrence arising in the future. The investigation does not seek to ascribe blame to any person but to establish the contributory factors of the accident or incident, based on the balance of probability.

A CAA Safety investigation seeks to provide the Director of CAA with the information required to assess which, risk-based regulatory intervention tools may be required to attain CAA safety objectives.

Glossary of abbreviations used in this report:

AGL	above ground level
AC	Advisory Circular
BFR	Biennial Flight Review
CAA	Civil Aviation Authority
CAR(s)	Civil Aviation Rule(s)
C of G	centre of gravity
CPL (A)	Commercial Pilot Licence (Aeroplane)
E	east
ft	foot or feet
hPa	hectopascals
kg	kilogram(s)
km	kilometre(s)
NZDT	New Zealand Daylight Time
QNH	barometric pressure adjusted to sea level
S	south
T	true
UTC	Coordinated Universal Time

AIRCRAFT ACCIDENT REPORT

OCCURRENCE No 12/5532

Aircraft type, serial number and registration:	NZ Aerospace Industries Limited FU24A-954, S/N 278, ZK-EMX
Number and type of engines:	One, Lycoming IO-720-A1B
Year of manufacture:	1980
Date and time:	8 December 2012, 1315 hours ¹ (approx)
Location:	Waikite Valley, Rotorua Latitude ² : S 38° 18.5' Longitude: E 176° 17.42'
Type of flight:	agricultural flight training
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	26 years
Pilot-in-command's total flying experience:	430 hours, 95 on type
Investigator in Charge:	Mr S Walker

¹ Times are NZDT (UTC + 13 hours)

² WGS-84 co-ordinates

Synopsis

The pilot was conducting solo agricultural flight training while under the supervision of a 'Category E' flight instructor. The instructor, who was operating another aircraft nearby, saw the aircraft perform a left turn and climb at approximately 400 ft AGL, followed by a departure from controlled flight from which the pilot did not recover. The instructor landed immediately and was first to reach the accident site where he found the pilot deceased.

1. Factual information

1.1 History of the flight

- 1.1.1 The pilot, who was undertaking training toward a Grade 2 Agricultural Pilot Rating, began work at approximately 0625 hours on the day of the accident. The pilot and his instructor, who was in another topdressing aircraft, flew to a block of land to the south east of Rotorua where the pilot completed 15 sowing runs, while his instructor worked in the local vicinity in the second aircraft.
- 1.1.2 The pilot and instructor completed the work on this block, had a break and then transited to the Waikite Valley, arriving at approximately 0945 hours.
- 1.1.3 At 1045 hours, after refuelling his aircraft, the pilot commenced sowing a 'special mix' fertiliser, in an alternating pattern between the instructor and pilot, with two aircraft operating from the airstrip. The alternating pattern allowed the instructor to observe and supervise the pilot during the take off and landing phases, while allowing the operation to proceed efficiently. The pilot and instructor stopped for lunch after an hour of flying, refuelled once more and then continued with their work.
- 1.1.4 The amount of fertiliser that was loaded into the pilot's aircraft was progressively increased as the work proceeded. The initial load of product was 900 kg, gradually increasing by 50 kg increments, when the instructor was satisfied that the pilot's performance allowed this increase. The last five loads carried prior to the accident were each 1100 kg.
- 1.1.5 Nothing untoward was noticed during the sowing runs, apart from the pilot aborting one landing attempt, due to the wake turbulence from the instructor's aircraft during take off.
- 1.1.6 At the time of the accident the pilot was performing 'clearing runs', sowing on remaining areas of land not already covered by previous sowing runs.
- 1.1.7 Immediately prior to the accident, the pilot called the instructor on the radio to enquire of his location. The instructor responded with "directly behind you on the other side of the woolshed"³.

³ The pilot was flying approximately 1500m to the west of the 'woolshed' when the transmission was made.

- 1.1.8 A few seconds later, as the instructor approached to land at the airstrip, he observed the pilot's aircraft flying in a westerly direction at approximately 400 ft AGL. He then saw the pilot's aircraft make a slight turn to the left. Describing what he had seen as: "he started to climb and turn slightly to the left, then the plane was in a left hand spin". The instructor thought at the time that the aircraft spun for one and a half rotations to the left, prior to being obscured by the ridge adjacent to the airstrip.
- 1.1.9 The accident occurred in daylight, at approximately 1315 hours, at Waikite Valley, Rotorua, at an elevation of 1460 ft. Latitude S 38° 18.5', longitude E 176° 17.42'.

1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Other</i>
Fatal	1	0	0
Serious	0	0	0
Minor/None	0	0	

1.3 Damage to aircraft

- 1.3.1 The aircraft was destroyed.

1.4 Other damage

- 1.4.1 Nil.

1.5 Personnel information

- 1.5.1 The pilot held a CPL (A) and a valid Class 1 Medical Certificate, appropriate for his Pilot Licence. In addition to his FU24 rating, he held ratings for Cessna 150, 172 and Piper PA-38 aircraft. His last BFR was conducted on 12 January 2012.
- 1.5.2 The pilot obtained his FU24 type rating on 26 September 2012. To achieve this he had completed 2 hours and 33 minutes of solo flight, receiving 2 hours and 42 minutes hours of dual instruction, low level circuits at 500 ft, steep turns and stalls. The instructor annotated in training records that the pilot "exhibited very good handling skills, was confident, and knew his limits".
- 1.5.3 Between 1 October and 5 October, during the early stages of the pilot's intermediate training, an intensive period of flight training was conducted. Intermediate training is described in AC 61-15 as: '*A period of pure flying instruction and solo practice intended to bridge the gap between the Commercial Pilot Licence standard and the standard required of the pilot prior to beginning role training*'. For the pilot, this phase of training included solo low level circuits at 150 ft to 200 ft, and airstrip work.

- 1.5.4 On 11 October 2012, after approximately 16 hours solo flight and 6 hours of dual instruction since commencing the training program, the pilot flew solo circuits at 100 ft, dumb-bell turns⁴ and downwind landings.
- 1.5.5 On 12 October 2012, the pilot began to operate the aircraft with a load onboard while under dual instruction. The instructor recorded in the pilots training notes that the pilot “was on a steep learning curve flying in very challenging conditions”.
- 1.5.6 On 7 November 2012 after approximately 25 hours of solo flight and 16 hours of dual instruction since commencing the training program, the pilot began to fly solo with a load of fertiliser on board.
- 1.5.7 Although the pilot had flown a total of approximately 95 hours during his training program when the accident occurred, no instructor certification appeared in the pilots training record to show completion of the intermediate training phase, prior to the commencement of flight training for elements of the agricultural phase.
- 1.5.8 The instructor made positive comments about the pilot’s progress throughout the training notes.
- 1.5.9 Although the instructor was an experienced agricultural pilot he had limited experience as an instructor. The instructor had previously trained another student agricultural pilot until, after approximately 14 hours of flight instruction, the instructor elected to cease the training of the student.
- 1.5.10 The operator provided a support network to the instructor consisting of management and instructor personnel with whom the instructor was in regular consultation.

1.6 Aircraft information

- 1.6.1 ZK-EMX was a New Zealand Aerospace FU24A-954, commonly known as a ‘Fletcher’. It was a low wing monoplane aircraft with two seats in a side by side configuration. The aircraft was an agricultural trainer variant equipped with dual controls; hence it could be flown from either seat.
- 1.6.2 The aircraft was constructed in May 1980 by New Zealand Aeroplane Industries Limited and was issued with a Non-Terminating Airworthiness Certificate on 20 May 1996, in the Restricted Category.
- 1.6.3 The aircraft was installed with a Lycoming IO720 –A1B engine and a Hartzell HC-C3YR constant speed propeller.
- 1.6.4 ZK-EMX had accrued approximately 11300 hours since it was first registered.
- 1.6.5 A Review of Airworthiness and an Annual Inspection had been carried out on 18 July 2012. No significant discrepancies were detected.

⁴ A turn that, when completed, results in the aircraft facing reciprocal to the original heading, while remaining close to the original track.

- 1.6.6 The hopper was situated in the centre fuselage, immediately aft of the cockpit bulkhead. The fertiliser was released from the hopper by the pilot manually activating a sowing lever situated between the two seats. The lever is connected to doors in the base of the hopper. In an emergency, the pilot is able to jettison the contents of the hopper by placing the lever in the full down position, causing the hopper doors open fully.
- 1.6.7 At the time of the accident the weight and balance of the aircraft was within the limits stated in the Flight Manual.
- 1.6.8 The aircraft was equipped with a vane type stall warning system which is designed to illuminate a light in the cockpit when an aerodynamic stall condition is impending⁵.

1.7 Meteorological information

- 1.7.1 The weather conditions (METAR) reported at Rotorua Airfield (approximately 12 Nm to the north of the airstrip) at 1300 hours were a very light north westerly breeze, a temperature of 17 degrees Celsius, scattered cloud at 5500 ft, and a QNH of 1016 hPa.
- 1.7.2 The instructor reported that the weather conditions were ideal for agricultural operations, with a light south westerly wind and good visibility. There were occasional wind gusts encountered which were considered by the instructor to be insignificant.
- 1.7.3 Weather conditions were considered not to be a factor in the accident.

1.8 Aids to navigation

- 1.8.1 Nil.

1.9 Communications

- 1.9.1 Nil.

1.10 Aerodrome information

- 1.10.1 Not applicable.

1.11 Flight recorders

- 1.11.1 Not applicable.

1.12 Wreckage and impact information

- 1.12.1 After striking the ground the airframe separated into two main sections. The forward section, which remained embedded in the ground at the point of impact, comprised the engine, its mount and cowls, the propeller, cockpit flight controls, the nose landing gear and instrument console.

⁵ When the relative airflow over the leading edge of the wing approaches a critical angle.

- 1.12.2 The aft section of the aircraft included the wings, main landing gear, hopper and its contents, fuselage and tailplane. The aft section had rebounded approximately eight metres from the point of impact.
- 1.12.3 Damage to the leading edge of the wings indicated that, at the time of the ground impact, the wings were level and the nose of the aircraft was pointing down at an angle of approximately 55 degrees.
- 1.12.4 Propeller damage indicated that the engine was not delivering high power when it struck the ground.
- 1.12.5 The two fuel tanks, integral to each of the wing leading edges, were disrupted and the contents had been lost, however there was sufficient indication from dead grass at the accident site to suggest that there had been fuel on board the aircraft. There was also a good quantity of fuel evident in the airframe fuel filter, which was clean and contained no evidence of contaminants. The instructor believed that, at the time when the accident occurred, the aircraft fuel tanks would have contained sufficient fuel for 45 minutes flight including the fuel reserve for 30 minutes required by the CARs.
- 1.12.6 There were no indications that a jettison of the load in the hopper had been attempted. Approximately 650 kg of the 'special mix' fertiliser was recovered from the aircraft hopper and from the external spillage, which was localised around aft section of the wreckage. The fertiliser appeared to be dry and suitable for aerial application.
- 1.12.7 Pre-impact integrity of the flight control system was established as far as possible at the accident site.
- 1.12.8 Detailed examination of the wreckage did not reveal any pre-existing technical discrepancies.
- 1.12.9 No useful instrument indications were available, due to damage caused by the forces involved in the accident.
- 1.12.10 The engine and propeller were taken to an engine overhaul agency where a strip and inspection was carried out under CAA supervision. This revealed that there were no technical discrepancies with the engine and propeller that could have been a factor in the accident.

1.13 Medical and pathological information

- 1.13.1 Post-mortem examination revealed that the pilot died of high energy impact injuries.
- 1.13.2 There was no evidence of any pre-existing medical condition that could have contributed to the accident.
- 1.13.3 Toxicological tests revealed no evidence of any substance in the pilot's bloodstream that could have contributed to the accident.

1.14 Fire

1.14.1 Fire did not occur.

1.15 Survival aspects

1.15.1 The accident was not survivable.

1.16 Tests and research

1.16.1 Nil

1.17 Organisational and management information

1.17.1 The pilot was employed by an agricultural aviation organisation certificated under Rule Part 137 *Agricultural Aircraft Operations*. The associated Operations Manual contained a '*Pilot Training Program*'. The respective forms provided for recording elements of the training stated that the pilot training "*will be carried out in accordance with the syllabus prescribed by CAR 61.701 and AC 61-15*".

1.18 Additional information

1.18.1 Nil

1.19 Useful or effective investigation techniques

1.19.1 Nil

2. Analysis

- 2.1 The weather conditions on the day of the accident were reported to be not challenging and the weight of the aircraft at the time of the departure from controlled flight should have been within the pilot's capability.
- 2.2 The evidence suggests that this was an accident involving an aerodynamic stall at low altitude. The altitude available was insufficient for the pilot to safely recover controlled flight.
- 2.3 The lack of any evidence of an attempt by the pilot to jettison the contents of the hopper is noteworthy. Had a weight reduction, from even partial jettisoning of the hopper contents been achieved, this would have assisted any attempt at stall recovery. However successful recovery to controlled flight in the height available would still not have been guaranteed.
- 2.4 At this relatively early stage in the pilot's agricultural training, although he demonstrated competency with normal handling of this aircraft type, he was probably not very familiar or proficient with the recognition of the cues relating to flight at the limits of its envelope, when the aircraft was loaded.
- 2.5 With inexperience and unfamiliarity the pilot may not have anticipated the likelihood of an emergency situation developing. Therefore his alertness to the possibility of a jettison being required during the turn could have been low.

- 2.6 No direct correlation was determined between the pilot's agricultural training program and the circumstances of the accident. However, the fact that the pilot was the subject of a supervised training program at the time of the accident, and the instructor was inexperienced in the role, cannot be disregarded.
- 2.7 A detailed review of the pilot's logbook and training records was undertaken by an experienced agricultural instructor pilot. While there were no compliance related discrepancies found concerning the pilot's training, anomalies existed with methodology and advancement of the training as applied to the pilot. These anomalies related to variations from the guidelines for 'acceptable methods of compliance' described in the AC. In particular, these variations concerned a 'blending' of the three distinct phases of the training program. Each distinct training phase should be completed before embarking on the next phase. The intent of the separation of the three training phases is to allow satisfactory consolidation and assessment of the pilot's skills at significant milestones, prior to progressing to more challenging training.

3. Conclusions

- 3.1 The pilot was appropriately licenced and held a valid medical certificate.
- 3.2 The aircraft had been appropriately maintained and no technical discrepancy was discovered that could have contributed to the accident.
- 3.3 It is likely that, during a climbing turn, the pilot inadvertently allowed an aerodynamic stall to occur at which point the aircraft suddenly departed controlled flight.
- 3.4 No emergency jettison of the hopper contents was attempted.
- 3.5 The height above the ground, was insufficient for the pilot to perform a successful recovery once the departure from controlled flight had fully developed.
- 3.6 The pilot's lack of experience with agricultural operations and relative unfamiliarity with the aircraft type could not be eliminated as having a bearing on the accident.

4. Safety actions

- 4.1 During a recent re-entry inspection for this operator's agricultural operator certification, personnel from the CAA's *Helicopter and Agricultural Unit* placed special emphasis on the operator's agricultural pilot training processes and associated procedures.
- 4.2 Though not directly as a result of this accident, an extensive project to assess the risk profile of the agricultural aviation sector has been undertaken. This has identified 16 key risk themes. The mitigation strategies will encompass agricultural pilot training.

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