



Report 00-015

Piper PA28-140

ZK-CIK

loss of control and impact with terrain

Amuri Range, near Hanmer Springs

19 December 2000

Abstract

On Tuesday 19 December 2000, at about 1700, Piper PA28-140 ZK-CIK departed from Forest Field aerodrome near Christchurch on a return scenic flight. On board the aeroplane were the pilot and 2 passengers. After circling several properties near Waiau in North Canterbury, the aeroplane was last seen at about 1745 heading in the direction of Hanmer Springs. At about 2100 the aeroplane was reported overdue to Police. At about the same time a local farming couple and their son, concerned about smoke up a valley at the back of their property, located the wreckage of ZK-CIK in an area of burning scrub. The 3 occupants had died on impact.

After attempting to cross a ridgeline, the pilot probably lost control of the aircraft while trying to turn back down the valley. The aircraft then impacted the ground in a near vertical attitude.

The investigation revealed that the pilot was probably not a fit and proper person, as described in the Civil Aviation Act 1990, to hold a pilot's licence. Civil Aviation Authority procedures could have identified the pilot as not being a fit and proper person, possibly as early as 1991.

The safety issue identified was the then lack of formalised Civil Aviation Authority procedures for determining that a person was "fit and proper" to hold a pilot's licence. Improvements to the procedures, especially since 1999, should prevent a reoccurrence of this type of accident.

The Transport Accident Investigation Commission is an independent Crown entity established to determine the circumstances and causes of accidents and incidents with a view to avoiding similar occurrences in the future. Accordingly it is inappropriate that reports should be used to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

The Commission may make recommendations to improve transport safety. The cost of implementing any recommendation must always be balanced against its benefits. Such analysis is a matter for the regulator and the industry.

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List of Abbreviations

AMA	Aviation Medical Assessor
AMSL	above mean sea level
ARA	Annual Review of Airworthiness
ATD	Air Transport Division of the Ministry of Transport
CAA	Civil Aviation Authority
CPL (A)	Commercial Pilot Licence (Aeroplane)
DME	Designated Medical Examiner
kg	kilogram(s)
km	kilometre(s)
m	metre(s)
nm	nautical mile(s)
PPL (A)	Private Pilot Licence (Aeroplane)
RPM	revolutions per minute
UTC	Co-ordinated Universal Time

Data Summary

Aircraft type, serial number and registration:	Piper PA28-140, 28-20227, ZK-CIK
Engine type and serial number:	Lycoming O-320-E2D, L-30574-27A
Year of manufacture:	1964
Date and time:	19 December 2000, at about 1745 ¹
Location:	4 nautical miles south of Hanmer Springs latitude: 42° 35.5' south longitude: 172° 52.2' east
Type of flight:	private, scenic
Persons on board:	crew: 1 passengers: 2
Injuries:	crew: 1 fatal passengers: 2 fatal
Nature of damage:	aircraft destroyed
Pilot's licence:	Commercial Pilot Licence (Aeroplane)
Pilot's age:	31
Pilot's flying experience:	about 450 hours
Investigator-in-charge:	I R M ^c Clelland

¹ All times in this report are New Zealand Daylight Time (UTC + 13).

1. Factual Information

1.1 History of the flight

- 1.1.1 On Tuesday 19 December 2000 the owner and pilot of ZK-CIK, a Piper PA28-140 Cherokee, arranged to conduct a local flight in the aeroplane, which was picketed² at Forest Field aerodrome west of Christchurch. At about 1615, while driving to Forest Field, the pilot uplifted 138 litres of AVGAS in 7 full containers from a local operator. A friend and his acquaintance accompanied the pilot.
- 1.1.2 At Forest Field, the pilot prepared ZK-CIK and fuelled it with 119 litres of fuel from the containers. The pilot loaded the passengers and started the aircraft. The friend and the pilot had flown together before and were seated in the front of the aircraft. The acquaintance was seated in one of the 2 rear seats.
- 1.1.3 The pilot taxied ZK-CIK to the threshold of grass runway 05 and completed an engine run-up³, during which “back-firing” was heard coming from the aircraft. According to a witness at the aerodrome, the engine was then run-up to “full power” for a short time. The witness saw ZK-CIK take off at about 1700, climb to about 300 feet, turn right and fly level for a while before turning left towards Rangiora and disappearing to the north. Apart from these manoeuvres the take-off and departure appeared normal to the witness.
- 1.1.4 Between about 1730 and 1745, ZK-CIK flew around several farms and houses on the Waiau Plains south of Amuri Range, about 8 nautical miles (nm) south-east of Hanmer Springs. Witnesses assessed the height of the aircraft to be as low as 100 feet above the tops of the trees as it orbited the properties. One witness was able to read several of the registration letters on the side of the aircraft as it flew past. Another witness, who had some experience flying a PA28-140 Cherokee, thought the aircraft was slow and the pilot was “hanging it around” - describing the manoeuvring of the aircraft. The witness believed that the slow speed was “related to holding 2200 RPM (revolutions per minute) without increasing power”⁴.
- 1.1.5 After circling the properties, ZK-CIK flew at low level towards a valley on Amuri Range. The valley ran in a north-westerly direction up to a saddle at about 2200 feet, over the range towards Hanmer Springs. A witness, located some distance from the valley, saw ZK-CIK sky-lined above the valley, probably heading in a westerly direction. This was the last sighting of the aircraft flying.
- 1.1.6 At about 2100, ZK-CIK was reported overdue to the Police. At the same time a farmer, whose property the pilot had been flying around, was concerned about smoke in the direction of the valley behind his house. The farming couple and their son drove up the valley to investigate the source of the smoke. Reaching an area of burning scrub, the son climbed down towards the valley floor and found the wreckage of ZK-CIK. There were no survivors. The farmer advised the Police of the accident by cellular telephone.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	1	2	-
Serious	-	-	-
Minor/nil	-	-	-

² The aircraft was secured by ropes to stakes in the ground.

³ The engine is run-up to 1800 RPM and checked.

⁴ 2200 RPM is an economical cruise power setting for the PA28 type aircraft.

1.3 Damage to aircraft

1.3.1 The aircraft was destroyed.

1.4 Pilot information

History of the pilot

- 1.4.1 The pilot, aged 31, held a Commercial Pilot Licence (Aeroplane) (CPL (A)) and was rated on the PA28-140 Cherokee. The pilot held a Class 2 medical certificate valid until 5 June 2003. The pilot's Class 1 medical certificate had expired on 5 June 1999. The pilot's flying log book was not located and so the date of the last biennial flight review and an accurate summary of flying experience could not be determined. Similarly, no assessment of the pilot's training or opportunity to practise mountain flying skills was possible. Civil Aviation Authority (CAA)⁵ medical records indicate the pilot had accrued some 450 hours' flying as of June 1998.
- 1.4.2 The pilot was raised in the Waiiau area and had lived on a farm near the accident site until about 1990.
- 1.4.3 On 20 April 1989 the Air Transport Division of the Ministry of Transport (ATD)⁶ assessed the pilot fit for Class 1 and Class 2 medical certificates⁷. A letter was sent with the certificates to the pilot on about 23 May 1989, reminding him of the requirement to notify ATD should he become unfit, including "...injury, of whatever cause, that might be likely to impair the performance of his/her duties". The assessment certificates were valid for 12 months for the Class 1 and 24 months for the Class 2. The pilot was issued with a Student Pilot's Licence on 18 January 1990.
- 1.4.4 On 4 September 1990, while attending a course of instruction at a pilot training organisation, the pilot was involved in a motor vehicle accident. Hospital records stated that as a result of the accident the pilot lost consciousness for an undetermined period of time and was admitted to hospital with head injuries, including fracturing of the skull. On 8 September 1990 the pilot was discharged to another hospital for facial plastic surgery. The pilot's last visit to hospital was recorded as being on 4 October 1990.
- 1.4.5 On 7 December 1990 the pilot attempted the Private Pilot Licence (Aeroplane) (PPL (A)) flight test but was unsuccessful. He re-sat the test the following day, passed and was issued with a PPL (A).
- 1.4.6 In January or early February 1991, the pilot was expelled from the pilot training organisation for behavioural problems, including ill discipline. The pilot was subsequently readmitted for theory instruction, but was not permitted to fly the organisation's aeroplanes.
- 1.4.7 On 21 February 1991 ATD received an incomplete interim health declaration form, for renewal of the pilot's medical certificates. A note from the pilot was attached to the form. The note stated that the pilot had received a "certificate to fly on 19-10-90". ATD had no record or knowledge of the certificate referred to by the pilot. On 22 February 1991 ATD assessed the pilot as temporarily unfit owing to the injuries he sustained in the motor vehicle accident. The pilot was advised of the assessment in a letter dated 27 February 1991. On 5 March 1991 a second interim health declaration form was completed and signed by the pilot, recording that the pilot had flown a further 10 hours since the first declaration.

⁵ The CAA, previously known as the Air Transport Division, was established by the Civil Aviation Act 1990.

⁶ In August 1992 ATD was replaced by the Civil Aviation Authority of New Zealand.

⁷ The 2 classes of medical certificates were related to different licence privileges. A valid Class 1 medical certificate was required to be held by a pilot engaged in commercial operations, including the carriage of fare-paying passengers.

- 1.4.8 On 9 April 1991 the pilot training organisation informed ATD that 2 aero clubs had been approached by the pilot wanting to hire an aircraft. The clubs had in turn contacted the training organisation asking about the pilot before approving the hire of an aircraft.
- 1.4.9 On 9 July 1991 ATD obtained a medical specialist's opinion and wrote to the pilot advising that the medical assessment had been changed to permanently unfit to hold a licence. The decision was based on concern about the pilot's "demonstrable impairment of cerebral functioning... consistent with the after-effects of a moderately severe head injury". The specialist wrote that when questioned by hospital staff a few days after the accident, the pilot replied that the period of "LOC was 20 minutes". The pilot subsequently denied any loss of consciousness, the specialist commenting that "this could of course mean concussion only". The specialist also reported that the pilot had suffered from double vision for about 4 months after the accident.
- 1.4.10 On 17 July 1991, as a result of the motor vehicle accident, the pilot was convicted of dangerous driving causing injury, fined and disqualified from driving for 18 months. The disqualification was effective from 17 July 1991. On 15 February 1992 the pilot was caught driving while disqualified and on 19 February 1992 was convicted and sentenced to a further 12 months' disqualification effective on completion of the first sentence - 17 January 1993.
- 1.4.11 On 27 April 1993, following legal representation and specialist medical reviews, CAA wrote to the pilot advising that it would reassess the pilot's medical fitness to hold a licence provided a satisfactory aviation medical examination was done. On 14 May 1993 the pilot visited a Designated Medical Examiner (DME) and underwent an aviation medical examination. As part of the examination the pilot completed a CAA general medical examination report form. Paragraph 15 of the form required the applicant to state if a "*civil aviation licence or medical certificate, or motor vehicle driver's licence [had] ever been denied, suspended, or revoked*". The pilot was recorded as saying "yes" to the question and explained on the form that it was related to a motor vehicle accident already notified to CAA. No disclosure was made about the second disqualification from driving, effective from 17 January 1993. The pilot also recorded having no unconsciousness or previous concussion (head injury), but ticked "yes" to being admitted to a hospital. On 19 May 1993 a CAA employee working as an Aviation Medical Assessor (AMA) and known as a Central Medical Assessor, approved the issue of Class 1 and Class 2 medical certificates for the pilot.
- 1.4.12 CAA records refer to a telephone call on 11 August 1993 made to the CAA medical section from a person who knew the pilot well, relating concerns about the pilot's fitness to fly. In response CAA requested the Police to provide a list of any traffic offences for the pilot. On 28 October 1993 in an internal memorandum to a senior executive, the CAA medical staff raised concerns about the pilot being a "fit and proper person" to hold a pilot's licence. Attached to the memorandum was the pilot's traffic conviction history list, which included the 2 driver disqualification convictions. No response to the memorandum was found on any of the CAA files on the pilot.
- 1.4.13 On 22 May 1995 the pilot underwent an examination by a different industry-based AMA for the renewal of the Class 1 medical certificate, which had expired on 18 May 1994. The Class 2 certificate was still valid until 18 May 1998. On the CAA examination report form the pilot recorded "no" against ever having had a CAA licence, medical certificate or driver's licence denied, suspended, or revoked, but "yes" for having been involved in a serious motor vehicle accident. The pilot recorded having no previous unconsciousness, concussion (head injury) or admission to a hospital.
- 1.4.14 On 4 September 1995 the pilot flew and passed a flight test for the issue of a CPL (A). Accompanying the flight test report and licence application form was a questionnaire to be completed by the pilot. The form, signed by the pilot, asked if there had been any conviction for a transport safety offence in the past 5 years and if an aviation document had been suspended or revoked. The pilot ticked "no" to the 2 questions. The pilot was issued with a CPL (A) on 6 September 1995.

- 1.4.15 On the medical examination report form completed 4 June 1998, the pilot recorded “no” for the suspension or revoking of a driver’s licence, unconsciousness, previous concussion (head injury) or admission to a hospital. The pilot did circle “yes” to a serious motor vehicle accident but annotated “no bad injury”. The pilot’s Class 1 medical certificate expired after one year on 5 June 1999. The pilot was still able to fly and carry non-fare-paying passengers with the Class 2 medical certificate, which was valid until 5 June 2003.

Other information

- 1.4.16 At the time of the fatal aircraft accident, the Police were about to suspend the pilot’s driver’s licence for 3 months. The pilot had accrued over the maximum allowable number of demerit points, having been caught exceeding the speed limit on several occasions. The pilot was also in the process of being charged by the Police for dangerous driving, following a motor vehicle incident on 15 December 2000.

1.5 Aircraft information

- 1.5.1 ZK-CIK was a Piper Aircraft Corporation PA28-140 Cherokee, serial number 28-20227 manufactured in the United States in July 1964. The aircraft was a 4-seat, low wing, tricycle undercarriage aeroplane powered by a Lycoming O-320-E2D engine, serial number L-30574-27A. ZK-CIK was imported into New Zealand new and had accrued some 15 037 hours.
- 1.5.2 In 1993, following a rebuild after an accident, ZK-CIK was purchased by a consortium for aerial photography and private work. The pilot joined the consortium in late 1993 and flew the aircraft in a private capacity. The pilot occasionally flew around the Waiiau area and would sometimes land on local airstrips there. On 24 February 1994, ZK-CIK was damaged in an accident near Otautau in Southland while being flown by another member of the consortium. Repairs to ZK-CIK were completed on 9 September 1994 and records indicate the aircraft left the Dunedin maintenance facility on 17 September 1994.
- 1.5.3 On 22 December 1994 a reported fuel blockage forced the pilot to land ZK-CIK in a paddock near the Rangitata River mouth. Two Timaru maintenance facilities were involved in the recovery and repair of the aircraft, which included replacing the propeller. No flying was recorded in the aircraft’s log book between 24 February 1994 and 10 February 1995, other than a test flight after the February 1994 accident.
- 1.5.4 In about early 1995 the pilot took full ownership of ZK-CIK and leased the aircraft to a local training organisation later that year. The lease was for about 18 months. In early 1998 the pilot leased ZK-CIK to a second training organisation, and the aircraft was based mostly at Ashburton aerodrome. The lease finished on about 25 September 1999 and the pilot then flew the aircraft to Forest Field, where the aircraft was picketed. This flight was not recorded in any of the aircraft’s log books.
- 1.5.5 The pilot had arranged with the owner of Forest Field to picket ZK-CIK at the aerodrome until alternative arrangements could be made. Records indicate that ZK-CIK did not fly from 25 September 1999 until 19 December 2000 - the day of the accident. However, witness reports confirm that the aircraft flew for about 30 minutes on a local flight on 9 December 2000 (refer to paragraph 1.5.14).

- 1.5.6 The aircraft log book for ZK-CIK records that the last maintenance servicing on the aircraft, a 100-hour check, was on 23 June 1999 at 14 962.72 airframe hours. A 50-hour check was annotated for 2 September 1999 at 15 014.73 hours, but no signature was recorded against the entry. The last Annual Review of Airworthiness (ARA) was recorded as being completed on 10 February 1999 - some 22 months before the accident. The maintenance schedule for the aircraft would also have required an annual maintenance check, which would have been completed in conjunction with the ARA. The ARA and annual check were required to be completed every 12 months.
- 1.5.7 In October and November 2000, the pilot approached at least 4 licensed aircraft maintenance engineers seeking to have work done on ZK-CIK. Three of the engineers, including an engineer who had maintained ZK-CIK for about 3 years, declined the work, each citing personal difficulties with the pilot. The fourth engineer agreed to look over the aircraft at Forest Field.
- 1.5.8 On 25 November 2000, the engineer met the pilot at Forest Field and together they inspected ZK-CIK. The aircraft battery was flat and jumper leads were used to connect a car battery to the aircraft. The aeroplane engine was started without difficulty and initially ran as expected. On running the engine up to full power, the engineer reported that a maximum of about 2100 RPM was achieved. The engineer had expected about 2350 RPM. The aircraft was moved into a hangar and the engineer completed a "leak down" test on the engine. The engineer later reported that one cylinder had unacceptably low compression, 2 cylinders had marginal compression levels and the fourth was acceptable. A review of ZK-CIK's aircraft and engine log books by the engineer showed a discrepancy between the serial number of the propeller on the aircraft and what was recorded in the engine log book.
- 1.5.9 On 27 November 2000 the engineer sent a facsimile to the pilot summarising the major servicing entries since 1993 and confirming the need to determine the status of the propeller. The engineer was to travel to Timaru on other matters and agreed to visit the maintenance facilities where ZK-CIK was repaired after the 22 December 1994 accident, and determine the origins of the propeller.
- 1.5.10 On 1 December 2000, after locating the original documentation for the propeller, the engineer returned to Forest Field and made an entry in the aircraft log book certifying the propeller had been installed on ZK-CIK on 2 February 1995. The engineer also obtained for the pilot copies of service bulletins, type certificate documentation for the PA28 type aircraft and requirements for the ARA.
- 1.5.11 The engineer said that he had become increasingly concerned about the general state of ZK-CIK and the attitude of the pilot towards maintenance matters and did not want to continue working on the aircraft. As the pilot had not arrived at the aerodrome as arranged, the engineer left a note citing other work commitments and recommending 2 engineers who might be able to complete the work. The engineer estimated in the note that it would take "40 to 60 manhours to make the aircraft serviceable, depending on work arising". Additional checks on the radio and instruments would also be required.
- 1.5.12 The pilot arrived at Forest Field before the engineer had left. The engineer said he advised the pilot the aircraft was "not in a fit state to fly" and a temporary certificate of airworthiness would be required to ferry ZK-CIK to an established maintenance facility to complete the required work. Further, he advised that one cylinder would need to be replaced but the 2 doubtful cylinders could be left on and "may come up after about 3 hours" engine running.
- 1.5.13 Interviews with the 2 engineers who were referred to the pilot confirmed the pilot had not approached them to work on ZK-CIK. One of the engineers was overseas at the time.

- 1.5.14 According to the pilot's fiancée, the engineer had instructed the pilot to fly 3 hours on ZK-CIK before the engineer would do any more work on the aircraft. The fiancée accompanied the pilot on the 9 December 2000 flight, which lasted about 30 minutes and went as far as Oxford before returning to Forest Field. The fiancée recalled that the pilot spent time manipulating the throttle and saying the aircraft was low on power.
- 1.5.15 The maximum allowable all-up weight for ZK-CIK was 2150 pounds (977 kilograms (kg)). The weight of one of the passengers and the fuel remaining after the flight on 9 December 2000 could not be accurately determined. However, from known information including the basic weight of the aircraft, pilot, one of the passengers and the fuel on-loaded on 19 December, the weight of ZK-CIK at take-off from Forest Field was calculated to be at least 2150 pounds (977 kg). At the time of the accident the aircraft was calculated to be within the centre of gravity limits and at about 2150 pounds all-up weight.

1.6 Meteorological information

- 1.6.1 The weather on the day of the accident was described by witnesses near the accident site as fine and warm, with the occasional light gust of wind from the north-west. During the evening the wind decreased. There was little cloud and no cloud at lower levels.
- 1.6.2 A local pilot, who had flown south from Hanmer Springs at about 1620, reported the weather as clear with about a 20-knot north-westerly wind aloft. The wind direction changed to north-east passing Mount Grey. On the return trip to Hanmer Springs, arriving at about 2015, the local pilot reported little wind until about abeam Culverden. At Hanmer Springs there was a strong westerly, described by the local pilot as "swirling". The local pilot had some problems controlling the aircraft during the approach and landing. Approaching Hanmer Springs the local pilot saw smoke in the general area of the accident site. The smoke was drifting to the south-east.
- 1.6.3 The weather at 1700 at Christchurch International aerodrome, 10 nm south-east of Forest Field, was reported as a surface wind of 050° magnetic at 10 knots, occasionally 15 knots, 20 km visibility and a temperature of 19°C. The forecast 2000-foot wind was 040° magnetic at 10 knots.
- 1.6.4 The sun at the accident site at 1745 on 19 December was calculated to be 23° above the horizon and on a bearing of 235° magnetic.

1.7 Wreckage and impact information

- 1.7.1 The accident occurred in the Blind Stream valley, which ran from the Waiau Plains to a saddle on the Amuri Range ridgeline, about one kilometre (km) north of Mt Leslie. The general height of the ridgeline in the area was about 2600 feet above mean sea level (AMSL). The height of the saddle was about 2200 feet AMSL. The valley was orientated in a north-westerly direction with a bend towards the north as it neared the ridge. The valley narrowed as it approached the ridge. The accident site was on the eastern side of the valley at 1700 feet AMSL and about 65 feet up from the valley floor, above the bend in the valley and about 500 feet vertically below the saddle on the ridgeline.
- 1.7.2 ZK-CIK impacted the ground in a near vertical attitude with the top of the aircraft facing towards the west and the floor of the valley. Damage to the left wing, including leading-edge crumpling and rearwards bending of the spar, was consistent with the left wing impacting the ground shortly after the propeller. The aircraft had caught fire on impact and little remained of the fuselage, wings and empennage. The aircraft had remained in the near vertical position until the fuselage collapsed onto its back as a result of the fire. All major components, or their burnt partial remains, of ZK-CIK were accounted for at the site.

- 1.7.3 Despite the intensity of the fire and damage to the fuselage, all flight control cables were located and traced from the control column and rudder pedals to the appropriate flight control surface. The flap control lever was set for 2 “notches” of flap. The position of the flaps could not be determined.
- 1.7.4 The propeller was buried about 20 centimetres into the rock and shingle surface with the engine remaining above it. The shaft connecting the engine to the propeller had broken. Witness marks on the propeller and the broken shaft indicated the propeller was rotating under power at the time of impact.

1.8 Medical and pathological information

- 1.8.1 Post-mortem examinations indicated the occupants of ZK-CIK died immediately after the aircraft impacted the ground. The examinations, including toxicological tests, did not reveal anything that would have affected the ability of the pilot to control the aircraft. There was no medical or pathological evidence of pilot incapacitation or impairment.
- 1.8.2 The pilot’s most recent medical examination was on 5 June 1998. There were no medical problems identified as relevant to the accident. The pilot was observed to be in good health and spirits and behaving as usual before the accident flight.

1.9 Fire

- 1.9.1 Post-impact fire destroyed much of ZK-CIK and badly burnt the occupants. The intensity of the fire was strong enough to melt much of the aluminium panelling but not the stainless steel control cables and engine components. The aircraft fire caused a localised scrub fire that covered an area of about one hectare and was contained within the valley before burning itself out.

1.10 Survival aspects

- 1.10.1 The accident was not survivable, with all occupants sustaining fatal injuries during the initial longitudinal deceleration on impacting the ground.

1.11 Additional information

Forest Field

- 1.11.1 Forest Field was a private aerodrome used mainly by local small aircraft owners. The aerodrome had several small hangars and 3 grass runways. The longest runway was 36/18 at 1000 metres (m), while 05/23, on which ZK-CIK took off, was 730 m. ZK-CIK had been picketed facing south near a hangar and tree line on the southern side of the aerodrome.
- 1.11.2 After the accident, 7 labelled fuel containers, 6 empty and one full, were located near where ZK-CIK had been picketed. The containers were identified as belonging to a local operator who had provided AVGAS to the pilot on the day of the accident. The 6 empty containers equated to 119 litres of AVGAS being dispensed into ZK-CIK. Fuel from the remaining container was checked and considered fit for its purpose.
- 1.11.3 The aircraft and engine log books for ZK-CIK were located in the hangar where the engineer had performed some maintenance on the aircraft. Included with the log books were the service bulletins, type certificate documents and the note left by the engineer (refer to paragraph 1.5.11.).
- 1.11.4 The mother of the pilot lived on a property about one nm east of the aerodrome.

Fit and proper person

- 1.11.5 The Civil Aviation Act 1990 required an aviation document holder, which included a PPL or CPL holder, to be a fit and proper person⁸. The criteria for determining that a person was fit and proper included the need to have regard to the person's compliance history with transport safety regulatory requirements, any convictions for any transport safety offence and any evidence that the person had committed a transport safety offence or had contravened or failed to comply with any rule made under the Act⁹. A history of mental health or serious behavioural problems was also to be considered.
- 1.11.6 Examination of the relevant CAA files, pilot and medical, showed that there had been no recorded response to the internal memorandum raising concerns about the pilot being a fit and proper person. CAA advised the Commission that had the memorandum been acted on, in accordance with its normal process, copies of any comment or action taken would have been placed on CAA's medical and general pilot files for the pilot concerned. CAA further advised neither of the personnel who would likely have been involved in any action had any recollection of the issue.
- 1.11.7 With the establishment of CAA in August 1992, informal procedures were developed to identify persons who were potentially not fit and proper to hold an aviation document. The assessment system relied on particular individual CAA officers to carry out certain actions. The managers would then brief the Director of Civil Aviation at their weekly meeting, and together determine a plan of action. The procedures were not documented, however, a sample of pilot files reviewed by the Commission was able to verify these procedures. From about 1994 interim guidance material was available to help in the process. This material included an increasing body of "case law" to give the officer conducting a review standards by which to apply the fit and proper person test. In about 1999 the guidelines were formalised and became standardised procedures applicable to operator and aircraft certificate holders as well as personnel licence holders such as pilots, maintenance engineers and air traffic control personnel.
- 1.11.8 In addition to the 1999 formalised procedures, CAA advised that a sample of aviation document applications would be subjected to further checks to help ensure all document holders were fit and proper persons. Between 5% and 10% of all applications would be subjected to the additional checks. For personnel licence applications, the checks would include the regular medical examination forms.

2. Analysis

- 2.1 There were no survivors of or eyewitnesses to the accident. The factors that were identified as contributing towards the accident were based on the physical evidence that was gained, including site and wreckage information, witnesses and the Commission's experience of accidents and incidents of this type. The profile of the pilot and comments on his suitability to hold a pilot's licence were based on witness interviews and other information obtained, including historical records. A summary of significant dates is at Appendix A.

The accident

- 2.2 The flight started as a round-trip scenic flight. No flight plan or flight notification to Air Traffic Services was made¹⁰. The weather on the day was suitable for the flight with generally fine, calm conditions at lower levels, but there was a developing north-west wind aloft.

⁸ Civil Aviation Act 1990, section 9 (3).

⁹ Civil Aviation Act 1990, section 10.

¹⁰ No notification was required as the flight was probably intended to remain outside controlled airspace.

- 2.3 The maximum fuel capacity for the PA28-140 was 185 litres. With an estimated 30 litres remaining from the first flight and 119 litres added for the second flight, there was ample capacity for the final 19 litres of fuel remaining in the container. That the last container of fuel was not used may indicate that the pilot was concerned about the weight of ZK-CIK. These figures indicate that the aircraft may have been close to the maximum all-up weight permitted, and possibly exceeded it.
- 2.4 The decision to use grass runway 05 and not the longer runway 36 was probably based on a desire by the pilot to fly past his mother's property to the east instead of considering the aircraft's weight and low power capability. The wind at Forest Field on the day of the accident would have differed little from Christchurch International aerodrome and so favoured runway 05. However, the wind, 050° magnetic at 10 knots, would still have given a headwind component of some 6 or 7 knots on runway 36.
- 2.5 After arriving in the Waiau area the pilot orbited several properties at a very low height, probably as low as 100 feet above the tops of the trees. The minimum height ZK-CIK should have been flown at was 500 feet above the terrain.
- 2.6 Witnesses reported no unusual noises or other aspects that would have indicated the aircraft had any mechanical or control problems. However, the observation by the witness with some experience on the PA28-140, that the aircraft was slow and holding 2200 RPM, was probably a fair assessment of the low power being delivered by the engine.
- 2.7 As the pilot orbited the properties the weather conditions were calm, giving little indication of a moderately strong north-west wind aloft. The sun would have been well to the left of the pilot as ZK-CIK flew in the direction of Hanmer Springs and should not have affected the pilot's vision. The north-west wind was probably blowing at or below the level of the Amuri Range, as subsequently indicated by the smoke from the fire. Such a wind could be expected to produce local downdraughts and turbulence close to the lee side of the range, below the tops where ZK-CIK was being flown.
- 2.8 Although ZK-CIK was seen heading at low level towards the valley, the last sighting of the aircraft sky-lined above the hills heading west could indicate that the pilot completed an orbit to gain height before entering the valley. Plotting of this last sighting corresponded to ZK-CIK still being east of the ridgeline by about one nm and below the height of the saddle.
- 2.9 While the pilot's intentions were not known, the flight path was consistent with crossing the Amuri Range by way of the saddle at the top of Blind Stream, en route to Hanmer Springs. Because the saddle was about 2200 feet high, the aircraft needed to be climbed to at least 2700 feet to provide a safe margin for crossing the range. The prudent course of action would have been to climb to 2700 feet before approaching the high ground; this would give a pilot maximum opportunity to assess wind and downdraught effects while retaining options for turning away from terrain if necessary. It would also have minimised the pilot's exposure to visual orientation problems, which can arise when flying low in mountainous terrain, especially when flying up rising and narrowing valleys.
- 2.10 The pilot was flying ZK-CIK up just such a rising and narrowing valley towards the saddle when the pilot appears to have lost control before impacting with the terrain. What margin of height above the valley the aircraft had was not known, but if it had been climbed directly from the observed position low over the Waiau Plains, it would not have achieved a margin above the saddle at the top of the valley.

- 2.11 The location of the accident site and the aircraft attitude and configuration at impact were consistent with a loss of control occurring during a turn to the right while confined within the valley. What may have led the pilot to having to attempt such a turn was not established, but it probably involved a realisation that the aircraft would not be able to fly across the saddle. This could have come about by an encounter with a downdraught near the head of the valley, or just by a late perception that the aircraft could not out-climb the rising terrain ahead of it.
- 2.12 While the pilot's training in mountain flying was not able to be established, it was probably not extensive, or he should have been able to anticipate the predicament in time to take avoiding action. Alternatively, the pilot may have become sufficiently accustomed to low flying, as reported over the Waiau Plains, that he continued at low level up the valley without realising that greater height margins were essential in the high, confined terrain.
- 2.13 The selection of 2 notches of flap would suggest that the pilot was either concerned about maintaining a safe margin above the stall speed of the aircraft as it encountered turbulence near the top of the ridgeline, was trying to provide a short-term increase in the aircraft's lift performance to get over the ridgeline or was attempting to tighten the aircraft's turn radius and escape down the valley.
- 2.14 There was no evidence to suggest that the engine, although low on power, failed catastrophically before impact. Given the amount of fuel uplifted at Forest Field, the duration of the flight and the intensity of the fire, it is unlikely that ZK-CIK ran out of fuel. There was no evidence of pilot impairment, fatigue or other personal factors that could have affected the pilot's ability to maintain control of the aircraft.
- 2.15 Examination of the accident site, including the impact damage, wreckage distribution, and the injuries sustained by the occupants, show that ZK-CIK impacted the ground nearly vertically under power and at moderate speed. This indicated the aircraft stalled and entered a steep spiral dive, probably to the right. The pilot was unable to recover from the stall before impacting the ground.
- 2.16 Regardless of the performance capabilities of ZK-CIK, the pilot should have maintained sufficient height and speed at all stages of the flight to permit a safe escape manoeuvre to be completed - even when encountering a sudden downdraught, engine malfunction or coming to the realisation that the aircraft would not successfully clear the ridgeline. That a safe escape was not achieved infers that the pilot persevered with flying up the valley to a point where he was not able to safely turn away.

ZK-CIK

- 2.17 After the termination of the lease on 25 September 1999, ZK-CIK was picketed in the open at Forest Field and not flown for about 14 months. The aircraft was not in a good state and would have required extensive work to bring it to a satisfactory airworthy standard.
- 2.18 The propeller fitted to ZK-CIK at the time of the accident was of the correct type for the aircraft. The engineer was being diligent in noting the discrepancy in the log books during the initial inspection at Forest Field. Why the fitting of the new propeller in February 1995 was not recorded in the engine log book was not determined.
- 2.19 The estimate that ZK-CIK had flown 15 037 hours (refer to paragraph 1.5.1) must be considered as approximate only. ZK-CIK was known to have flown on several occasions where the times were not recorded in the aircraft log book. The pilot was also known to have flown the aircraft on some of these occasions, including the positioning of the aircraft at Forest Field and the flight on 9 December 2000.

- 2.20 Although theoretically the aircraft had 25 hours to run to the next scheduled 100-hour servicing, the ARA and annual aircraft check were overdue by some 10 months - rendering the aircraft unairworthy according to CAA Regulations. In an attempt to bring the aircraft to an airworthy standard, the pilot had contacted several engineers to perform the work but only one engineer would initially look at the aircraft. After meeting the pilot and inspecting ZK-CIK the engineer also wanted to discontinue working on the aircraft and so wrote a note to recommend other possible engineers and withdraw from working on the aircraft.
- 2.21 The pilot had told at least one other person that ZK-CIK needed to have 3 hours' flying before being given a major servicing. The intention of this was probably to try and have the compression levels of the 2 marginal cylinders improve to a satisfactory level to avoid the cost of having them replaced. The flight was, therefore, probably one of several short local flights that the pilot intended to complete before seeking engineering support for the ARA, annual check and any extra work required.

The pilot

- 2.22 The pilot displayed characteristics that were not conducive to safe aviation. He paid little regard for air transport related rules and regulations, regularly infringed road traffic laws and misrepresented the truth on 4 recorded occasions - the 3 medical report forms and the CPL (A) questionnaire.
- 2.23 There was conflicting evidence over the injuries the pilot sustained in the motor vehicle accident of 4 September 1990. A loss of consciousness for 20 minutes (refer to paragraph 1.4.9) would have been consistent with a brain injury of the severity described in the hospital reports and by the specialist who examined the pilot on 9 July 1991. The subsequent reference in the same paragraph to "concussion only" would infer only a minor brain injury was sustained. The double vision for 4 months after the accident suggested a more severe injury to the central nervous system than a simple concussion brain injury.
- 2.24 Arguably, the pilot may have considered that he had not suffered a period of unconsciousness as a result of the motor vehicle accident. If the pilot had been identified as being unconscious, as indicated by hospital records, medical staff should have advised him accordingly. No evidence of this was found. Nevertheless, the pilot did suffer at least a concussion because of serious head injuries sustained in the motor vehicle accident. This should have been recorded on the medical examination report forms.
- 2.25 There was no evidence that the pilot, although having been made aware of the requirement by letter, notified CAA of the motor vehicle accident on 4 September 1990, advising it of the injuries sustained in the accident. Despite having been concussed in the accident and suffering from double vision, the pilot continued to fly, sitting the PPL flight test on 7 and 8 December 1990.
- 2.26 The reason the pilot submitted the first interim health declaration form 2 months before the Class 2 medical certificate was due to expire was not determined. Because the form was incomplete and the pilot's accompanying note referred to an apparently non-existent "certificate to fly" may suggest the pilot was in a confused state of mind at the time.
- 2.27 According to the health declaration forms submitted by the pilot, the pilot probably continued to fly after being advised of being temporarily medically unfit to fly. The pilot had by this stage gained a reputation within the local aviation fraternity for being difficult and ill disciplined.
- 2.28 After being assessed as permanently medically unfit, seemingly based on the pilot's cognitive performance, the pilot sought legal recourse to have the assessment changed. CAA agreeing to the request was based on either: an acceptance that the behaviour displayed by the pilot was not necessarily the result of the accident but was probably the normal character of the person, or that there were no medical grounds to permanently withhold his medical certificate, or both.

- 2.29 The pilot had a record of misrepresenting himself to CAA, as indicated by the 3 medical report forms and the questionnaire. The forms clearly stated that the pilot needed to inform the DME or AMA of any motor vehicle licence being suspended or revoked, of any serious motor vehicle accident and any unconsciousness, concussion or admission to hospital. At no time were these medical examination reports correctly filled in by the pilot. Further, on the questionnaire signed by the pilot on 4 September 1995, the 2 driver disqualifications and suspension of the pilot's licence were not reported.
- 2.30 The pilot's decision to fly ZK-CIK, especially with passengers, on 9 and 19 December 2000, when it did not have a current release to service, required extensive maintenance work and had an engine that was incapable of producing normal power, was unwise.
- 2.31 Before carrying passengers, a pilot was required to have flown 3 take-offs and landings in the preceding 90 days¹¹. There was no record or evidence that the pilot met this requirement. The currency of the pilot's biennial flight review¹² was not determined. There was no record of any flight review being flown by the pilot in ZK-CIK during the about 18 months the aircraft was based at Ashburton. The aircraft was then picketed at Forest Field for about 14 months and not flown until the first local flight on 9 December 2000. The flight review could, however, have been flown in another similar type aircraft over this period. No evidence of this was found.
- 2.32 The pilot had a history of road traffic offences resulting in 2 driver disqualifications and a third disqualification about to be enforced at the time of the accident. The more serious offences included dangerous driving and driving while disqualified. A second dangerous driving charge was also pending at the time of the accident. The seriousness and frequency of the offences raised doubts as to the pilot's suitability under the CAA Act to have retained a pilot's licence.
- 2.33 The low flying by the pilot before heading towards Hanmer Springs was an example of his attitude towards regulations and safety.
- 2.34 The parents and fiancée of the pilot contended that he was an accomplished pilot and had considerable experience flying in the hills, especially in the area of the accident. Further, they believed that while the pilot was perhaps over zealous at times, they said he was conscientious and would not have flown ZK-CIK had he been told categorically that the aircraft was not serviceable.

Fit and proper person

- 2.35 As early as 1991 there were several incidents, including the pilot continuing to fly and trying to hire aircraft, after the accident and probably after being advised of being temporarily medically unfit, that raised questions about the pilot's suitability to hold a licence. Reference to these flights, including the PPL (A) flight tests and attempted hire of club aircraft, was contained on the pilot's CAA files. These incidents should have alerted CAA to the requirement to at least supervise closer the pilot's participation in the aviation industry.
- 2.36 The decision by CAA in April 1993 to permit the pilot to be reassessed fit on medical grounds to hold a pilot's licence was correct. The pilot had undoubtedly recovered physically from the effects of the motor vehicle accident of 4 September 1990 and civil aviation rules did not permit CAA to make a person medically unfit due to behavioural problems.

¹¹ Civil Aviation Rules, Part 61.37(b), effective 30/4/99.

¹² A flight review with a qualified flight instructor, valid for a maximum of 2 years.

- 2.37 After an acquaintance of the pilot contacted CAA on 11 August 1993 and questioned the pilot's fitness to fly, CAA medical staff did request additional information from the Police. The medical staff then raised their concerns with a senior CAA executive, specifically questioning the pilot being a fit and proper person. There was, however, no recorded review of the pilot's medical file, which should have highlighted a history of contradictions and misrepresentations by the pilot on the medical examination report form completed in May 1993, and the hospital records and assessments by various specialists after the motor vehicle accident in 1990.
- 2.38 Having raised the issue with the CAA executive, the medical staff did not continue to monitor the pilot's file, which would again have provided an insight into the pilot's character. Why the licensing division of CAA did not action the memorandum was not determined. When a copy of the medical examination report for the issue of the Class 1 and Class 2 medical certificates on 22 May 1995 was filed, it was placed directly over the CAA memorandum questioning the pilot's fit and proper person status.
- 2.39 Better co-ordination between CAA medical and licensing staff would probably have resulted in a closer monitoring of the pilot once medical staff had determined the pilot's manner and actions were indicative of his normal behaviour. Had this been the case then it is likely that, based on the pilot's history, he would have been deemed not a fit and proper person to participate in the aviation industry. At the very least a review of the pilot's suitability to hold a pilot's licence would have been completed and the pilot made aware of CAA's concerns.
- 2.40 The misrepresentations on the pilot's medical examination report forms could have been detected by the DME and AMAs who conducted the medical examinations, had they questioned him further or checked with CAA. The CAA Central Medical Assessor, who approved the first medical certificate after the 1990 motor vehicle accident, was also in a position to identify the misrepresentations on the medical examination form. However, the inconsistencies between the 3 medical examination forms, CPL (A) questionnaire and known history of the pilot, could only have been identified by a CAA review of the pilot's files.
- 2.41 The CAA's fit and proper person review procedures in 1993, when the internal memorandum was written, were informal, undocumented and inadequate. The procedures had since been formalised and provided a more standardised process for the handling of these reviews. The introduction of the formalised procedures and sampling of document applications would help identify any person who was not fit and proper.

3. Findings

Findings are listed in order of development and not in order of priority.

- 3.1 The pilot was licensed and medically fit to conduct the type of flight flown on 19 December 2000.
- 3.2 The aeroplane was not airworthy, in that it required major maintenance and did not have a current release to service, but there was no evidence that mechanical failure was a factor in the accident.
- 3.3 The aeroplane engine was not able to achieve full power owing to low compression in 3 of the 4 cylinders, which would have reduced the pilot's chance of escaping from the valley.
- 3.4 The weather was suitable for the flight.
- 3.5 The aeroplane was near and possibly over its maximum allowable weight at take-off, which would have reduced the pilot's chance of escaping from the valley.

- 3.6 The pilot's licence was probably not current in that he had not flown 3 take-offs and landings in the previous 90 days or completed a biennial flight review test.
- 3.7 The aeroplane was not being flown with adequate safety margins, which resulted in the pilot being unable to conduct a safe escape manoeuvre from the valley.
- 3.8 The pilot probably lost control of the aeroplane while attempting to escape from the confines of the valley, resulting in a stall from an unrecoverable height.
- 3.9 Based on the recorded history of the pilot, as detailed in section 1.4 of this report, he was probably not a fit and proper person to hold a pilot's licence.
- 3.10 The information was available to CAA to make it aware that the pilot was probably not a fit and proper person to hold a pilot's licence, possibly as early as 1991.
- 3.11 Current CAA procedures should assist in identifying and dealing with a person who was possibly not fit and proper to hold an aviation document.

Approved for publication 16 May 2001

Hon. W P Jeffries
Chief Commissioner

Appendix A

Summary of significant dates

<u>Date</u>	<u>Event</u>
<u>1989</u>	
20 April	Pilot assessed medically fit for Class 1 and Class 2 medical certificates.
23 May	Letter sent to pilot with medical certificates and informing him of the requirement to notify ATD if becoming unfit.
<u>1990</u>	
18 January	Pilot issued with Student's Pilot Licence.
11 June	Pilot caught speeding, fined.
4 September	Pilot involved in serious motor vehicle accident.
4 October	Pilot's last recorded visit to hospital.
7 December	Pilot flies PPL flight test.
8 December	Pilot re-sits PPL flight test.
<u>1991</u>	
21 February	ATD receives incomplete health declaration form from pilot.
22 February	Pilot assessed as temporarily unfit.
22 February	ATD advises the pilot has been expelled from the training organisation. Readmitted for theory only.
5 March	A second health declaration form is completed indicating he has flown 10 hours since 21 February.
10 March	Pilot caught speeding, fined.
9 April	ATD advised pilot trying to hire aircraft.
14 June	Report by ATD-approved specialist after examining pilot.
4 July	Pilot assessed as permanently unfit.
17 July	Pilot convicted of careless driving as a result of the motor vehicle accident on 4 September 1990, fined and disqualified from driving for 18 months.
<u>1992</u>	
15 February	Pilot caught driving while disqualified and refuses to give name.
19 February	Pilot convicted for above, fined and disqualified from driving for 12 months effective from 17 January 1993.
18 November	Report by pilot-sourced specialist after examining pilot.
<u>1993</u>	
31 March	Report by pilot-sourced specialist after examining pilot.
27 April	CAA writes to pilot advising it is prepared to assess the pilot fit subject to a full medical examination.
14 May	Pilot completes aviation medical examination.
19 May	CAA medical assessor approves medical certificates.
11 August	Telephone call to CAA questioning pilot's fitness to fly.
circa October	Pilot purchases share in ZK-CIK.
28 October	Internal memorandum from CAA medical section to CAA executive expressing doubt about the pilot's "fit and proper person" status.

1994

24 February ZK-CIK damaged in accident in Otautau.
9 September Repairs to ZK-CIK completed.
17 September ZK-CIK departs repair facility but no record of flight.
22 December ZK-CIK damaged in forced landing near Rangitata River mouth - pilot flying.

1995

9 May Pilot caught speeding, fined.
21 May Pilot involved in minor motor vehicle accident.
22 May Pilot completes aviation medical examination.
circa August Pilot obtains full ownership of ZK-CIK.
4 September Pilot completes CPL (A) and returns questionnaire to CAA.

1996

11 March Pilot involved in minor motor vehicle accident.
24 March Pilot caught speeding, fined.

1997

9 March Pilot involved in minor motor vehicle accident.

1998

15 January Pilot involved in motor vehicle accident and issued with infringement notice by Police.
4 June Pilot completes aviation medical examination.
16 July Pilot caught speeding, fined.

1999

10 February Last recorded ARA and annual servicing on ZK-CIK.
23 June Last recorded 100-hour inspection on ZK-CIK.
2 September Unsigned 50-hour inspection recorded in log book for ZK-CIK.
25 September Last recorded flight of ZK-CIK.
circa September ZK-CIK positioned at Forest Field.

2000

12 July Pilot caught speeding, fined.
14 July Pilot caught speeding, fined.
25 November Aircraft engineer inspects ZK-CIK with pilot.
1 December Aircraft engineer updates log book for ZK-CIK and withdraws from further work on the aircraft.
9 December Pilot completes a short local flight in ZK-CIK with one passenger.
15 December Pilot involved in driving incident. To be charged with dangerous driving.
December Police processing the suspension of the driver's licence for the pilot owing to the accrual of demerit points.
19 December Accident flight.