



Report 00-011

Cameron A-180 hot air balloon ZK-FAS

collision with power line

Taupo

28 October 2000

Abstract

On Saturday 28 October 2000, Balloons over Taupo Cameron A-180 hot air balloon ZK-FAS was on a local flight near Taupo with 7 passengers and one crew when an unanticipated wind increase necessitated a prompt landing. During the landing approach the pilot endeavoured to extend the flight path over a power line which he had seen at a late stage. The balloon basket struck and broke the 3 wires of the power line before landing in the next paddock. There were no injuries and no damage to the balloon.

The incident resulted from the pilot's late sighting of the power line, which probably resulted from his not moving to get an unobstructed view ahead, and some preoccupation with the landing approach in the windy conditions.

Safety issues identified include flying earlier in the day, and the selection of launch sites in the Taupo region to enable more landing options.

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List of Abbreviations

kg	kilogram(s)
m	metre(s)
nm	nautical mile(s)
UTC	Coordinated Universal Time

Data Summary

Aircraft type, serial number and registration:	Cameron A-180 hot air balloon, 3479, ZK-FAS
Number and type of engines:	Cameron Shadow/Stealth double burner
Year of manufacture:	1995
Date and time:	28 October 2000, at about 0830 ¹
Location:	Kaihua Road, Taupo
Type of flight:	air transport, local scenic
Persons on board:	passengers: 7 crew: 1
Injuries:	nil
Damage:	3 power wires and pole broken
Pilot's licence:	commercial pilot licence (balloon)
Pilot's age:	41
Pilot's total flying experience:	156 hours 4 hours on type
Investigator-in-charge:	J J Goddard

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

1. Factual Information

History of the flight

- 1.1 On Saturday 28 October 2000, the pilot of Balloons over Taupo Cameron A-180 hot air balloon ZK-FAS had a booking for a group of 14 people to take a balloon flight. As this was more than the capacity of his 2 balloons, he had arranged for another commercial balloon operator to come to Taupo with a similar size balloon to fly some of the passengers.
- 1.2 At about 0530 the pilot checked the weather information, and decided the day was suitable for the flight, which would commence from the Wairakei Resort, some 4 nautical miles (nm) north of Taupo, where the group were staying. With his ground crew and the second balloon team, they drove to the launch site, arriving at 0630. After meeting the group, which had dwindled to 12 passengers, they released a pilot balloon to check the local wind, which was northerly at about 2 knots. This wind was confirmed by a second pilot balloon at about 0715. Inflating the balloons and passenger boarding were complete by 0730, and both balloons lifted off at 0735.
- 1.3 The flight initially proceeded normally, with the balloons tracking to the south, up the Waikato River valley towards Taupo at a height of between 500 and 1000 feet, and passing over a golf course, forest and geothermal areas before arriving over open farmland at about 0820. After travelling about 2 nm from the launch site in some 50 minutes, the pilots were starting to select suitable areas for landing when the wind began to increase markedly and veer slightly to the north-east. The pilot of ZK-FAS recalled that his GPS indicated a ground speed of about 10 knots.
- 1.4 The second balloon was landed promptly in a suitable paddock without incident, but the pilot of ZK-FAS was not able to land straight away because his track was along a power line, and then over paddocks full of stock.
- 1.5 As ZK-FAS overflew the stock, the pilot saw there were 3 clear paddocks ahead of the balloon, with unsuitable terrain beyond. He descended the balloon on a landing approach towards the first paddock, but then noticed a power line which he had previously not seen at the far end of the paddock and decided to extend the approach, with the intention of landing in the second or third paddock. He responded without delay by heating the balloon with both burners, and it started to climb from a height of about 10 feet. As they approached the power line he realised that the basket would not clear it, so he warned the passengers to prepare for an emergency landing.
- 1.6 The basket of the balloon struck and broke the 3 wires of the power line, with some electrical arcing evident. The pilot then vented the balloon in order to land it in the next paddock.
- 1.7 The balloon landed firmly in the paddock past the power line, but it remained upright and came to a halt after a ground slide of a further 25 metres (m). No injuries to occupants or damage to the balloon resulted from the collision or the landing. The power line wires were repaired, and one pole replaced later that day.

Personnel information

- 1.8 The pilot of ZK-FAS had commenced balloon flying training in January 1999 and had completed his commercial pilot licence (balloon) in May 2000. The class 1 medical certificate associated with his licence was valid to 12 December 2000.
- 1.9 The majority of his 156 hour's flying had been in a Cameron N-105 type; he had obtained the larger A-180 balloon ZK-FAS in September 2000 and had since made 4 flights in it. In the last 90 days he had flown 13 hours, including the 4 hours on ZK-FAS.

- 1.10 The pilot also held an aircraft maintenance engineer licence, and operated an avionics maintenance facility in Taupo. He was also a principal of a biplane joyride operation based at Taupo aerodrome. He did not hold any other pilot licences.

Aircraft information

- 1.11 ZK-FAS was a Cameron A-180 balloon with an envelope volume of 180 000 cubic feet. It had flown 47 hours since new in June 1995. Maintenance records showed that the next routine maintenance was due at 143 hours or 14 September 2001, whichever occurred first.
- 1.12 The balloon was fitted with a Cameron 5-compartment basket and with double burners fed from four 80-litre fuel tanks. The estimated weight at lift-off was 1330 kilograms (kg).
- 1.13 The maximum permitted weight was 1633 kg, while the temperature-limited maximum weight for the conditions of the flight was estimated as 1388 kg.

Site information

- 1.14 The grass paddock in which ZK-FAS had landed was about 250 m long, and sloping down slightly to the southwest, the direction of landing. It was bounded on the north side by a farm road, and a 3-wire 11 kilovolt power line supported on poles approximately 23 feet high. The poles were not obscured by any vegetation or buildings, and were prominent between 2 fences along the road.
- 1.15 The balloon had landed 33 m past the power line, and slid for 25 m before coming to a halt.
- 1.16 The next paddock along the balloon's projected track appeared to be suitable for landing, but beyond that no further suitable landing area for the conditions of the day was evident because of suburban development, and then the shore of the lake towards Acacia Bay.

Meteorological information

- 1.17 An anticyclone was centred just east of North Island, giving fine settled weather in the area with a light northwest flow.
- 1.18 Sunrise at Taupo on 28 October was at 0612.

Other information

- 1.19 The pilot thought his late sighting of the power line resulted from his view of the power poles being blocked by passengers during the landing approach.

2. Analysis

- 2.1 This balloon wire strike incident occurred during a landing approach in moderately windy conditions, when the pilot saw a power line between the first and second of 3 suitable landing paddocks, and decided to extend the approach to the second paddock. This manoeuvre required a significant heat input from the burners, since the balloon was already descending below power line height, and a transition to a climb was necessary to clear the line.
- 2.2 When the pilot made the decision to extend his approach to the second paddock following his late sighting of the power line, he had the alternative choice of continuing or perhaps steepening the approach to land in the first paddock. Whether this would have resulted in a safe landing could not be assessed, but the pilot's decision and action in promptly operating both burners indicated his preference for not landing. The fact that the resulting climb was not sufficient to clear the power line indicates that this course of action probably was not a viable option, given the balloon's height and descent rate, manoeuvring response, and groundspeed and distance to go at the time the action was taken.
- 2.3 This analysis of the pilot's decision infers that he made some misjudgement of the situation and the balloon's available response. While some misjudgement would be likely, given his low experience with the larger A-180 balloon, his action was more probably attributable to his late sighting of the power line, which resulted in a snap decision rather than an evaluation of both options first. The power line, or the poles supporting the wires, should have been visible from a greater distance, enabling the pilot to take it into account by adjusting the approach at an earlier stage.
- 2.4 While the pilot attributed his not seeing the power line earlier to passengers blocking his view of the poles, it may have also resulted from some preoccupation with flying the approach in the windy conditions, and thus neglecting to look for power lines or other hazards. He was generally aware of several power lines in the area, having just been prevented from landing by the balloon tracking along one. Power lines and other elevated wires are a significant and well-known hazard in balloon operations, and a deliberate visual search for them is a necessary pilot procedure when descending to land. This may routinely require the pilot moving to the forward side of the basket to get an unobstructed view ahead.
- 2.5 The pilot was probably subject to some increased anxiety about landing the balloon because of the recent increase in wind speed, which not only entailed making an accurate approach into a large enough paddock to accommodate a faster landing, but was also carrying the balloon to the end of the area of suitable landing places. He had seen the second balloon being landed promptly after the wind increase, but had not been able to land his own balloon because his track was over obstructed paddocks. The increased stress of such a situation would have been likely to cause undue preoccupation with the approach, or "target fixation", to the detriment of other pilot tasks such as maintaining vigilance for wires.
- 2.6 An increase in low-level wind after the early morning calm period is a normal occurrence in the fine settled weather conditions which are favoured for ballooning. The calm or light surface wind results from nocturnal cooling which generates a low-level temperature inversion. This inversion layer effectively separates the general airflow from the surface, creating calm conditions. After sunrise, diurnal warming will break down the inversion, allowing the low-level air to recouple to the general flow, as well as adding energy to the flow. The time taken for the wind to increase varies with a number of factors, but may be only 90 minutes after sunrise, or up to 3 hours on some days. In spring, not only does the sun rise earlier each day, but its warming effect occurs progressively more quickly and the night inversion gets progressively less intense with shorter nights, so the resulting earlier increase in wind speed may surprise a balloon pilot relying on his recent experience of the phenomenon. Most experienced balloon operators arrange their operation to lift off around or shortly after sunrise, for a one-hour flight.

- 2.7 This flight started at 0735, which was some 80 minutes after sunrise, and the wind increase occurred 50 minutes into the flight, or some 2 hours 10 minutes after sunrise. A change in procedure to ensure earlier lift-off times would enhance the safety of this balloon operation.
- 2.8 The surface features of the region around Taupo include a large proportion of hilly and forested terrain. While there are also areas of clear farmland, the area overall probably offers fewer suitable landing sites to the balloon pilot than most other areas of New Zealand where commercial ballooning is carried out. In addition, any such flight towards Lake Taupo has a natural limit imposed by the lake. A balloon operator in such an area needs to select launch sites more carefully to ensure that a good choice of landing sites will be available for the possible variations of an intended flight. In this case, the general area expected at the end of the flight with the 2 knot northerly wind did offer a number of suitable paddocks, but with the increased wind the balloon was carried on to where the options for landing were starting to run out. Attention to launch site selection to enable more landing options in the event of unexpected wind variations would enhance the safety of this balloon operation.
- 2.9 The pilot's action after the collision with the power line, in venting the balloon, was appropriate and resulted in a normal landing.

3. Findings

- 3.1 The pilot was appropriately licensed for the operation, but inexperienced in handling the A-180 type balloon.
- 3.2 The balloon was serviceable, appropriately maintained, and loaded within approved limits.
- 3.3 The balloon flight was conducted beyond the end of the early morning calm weather, resulting in an increase in wind not expected by the pilot.
- 3.4 The balloon flight should have been conducted earlier in the day.
- 3.5 The pilot's action in extending the landing approach resulted from his late sighting of a power line.
- 3.6 The timing of the pilot's action to extend the landing approach made the collision with the power line unavoidable.
- 3.7 The pilot's late sighting of the power line probably resulted from his not moving to get an unobstructed view ahead, and some preoccupation with the landing approach in the windy conditions.
- 3.8 The location of the launch site did not ensure a good choice of landing sites with the increased wind.
- 3.9 The pilot's action after the power line collision, in venting the balloon to land, was appropriate.

4. Safety Actions

- 4.1 The pilot subsequently advised that the operation had been changed to ensure that balloon lift-off occurred within 15 minutes of sunrise, and that launch site locations were selected to allow a better choice of landing areas.