Report 97-006

Cameron O-160 hot air balloon

ZK-FBS

power line incident

Waimauku, Auckland

1 April 1997

Abstract

On Tuesday 1 April 1997 at 0828 hours, Cameron O-160 balloon ZK-FBS, on a passenger scenic flight, was making a go-around from a missed landing approach in foggy conditions when it contacted a power line. No injury or damage to the balloon resulted.

A wind shift led to the missed landing approach. The go-around manoeuvre was insufficient or too late to avoid the power line.

A safety issue addressed was the recent non-availability of Whenuapai and Ohakea weather information for pre-flight briefings.

Transport Accident Investigation Commission

Aircraft Incident Report 97-006

Aircraft type, serial number and registration:	Cameron O-160 hot air balloon 1470, ZK-FBS
Year of manufacture:	1987
Date and time:	1 April 1997, at 0828 hours[1]
Location:	Waimauku, Auckland Latitude: 36° 46.2' S Longitude: 174° 29.7' E
Type of flight:	Air Transport, Scenic
Persons on board:	Crew: 1 Passengers: 8
Injuries:	Nil
Nature of damage:	Nil
Pilot-in-Command's Licence:	Commercial Pilot Licence (Balloon)
Pilot-in-Command's total flying experience:	273 hours 24 hours in last 90 days
Investigator-in-Charge:	J J Goddard

[1] All times in this report are in NZST (UTC + 12 hours)

1. Factual Information

1.1 At about 0600 hours on Tuesday 1 April 1997, the balloon pilot and his ground crew met the eight passengers at their pre-arranged rendezvous on Albany Hill. The pilot released a helium-filled pilot balloon to check the wind, and measured its track as 257° magnetic. He then looked around to check the visibility which he estimated as 16 km or better. The ridgeline of the Riverhead Forest, and the Kumeu sawmill chimney were visible in the dawn light. The sky was clear, with no cloud.

1.2 A school playing field in Albany was chosen as the launch site for the flight, and the group were driven there in the operator's vehicle with the balloon, ZK-FBS, on its trailer. Another pilot balloon ascent confirmed the wind direction, so the balloon was rigged, inflated and prepared for flight.

1.3 After the passengers were loaded, and the balloon was ready to lift, the pilot telephoned Whenuapai Tower at about 0710 hours, to advise the controller of the flight and to obtain a clearance to operate in the Whenuapai Control Zone. This was achieved, and the controller advised the pilot of shallow fog at Whenuapai and lying in the nearby valleys.

1.4 The balloon lifted off at 0715 hours without incident, and the pilot established radio contact with Whenuapai Tower. The flight proceeded normally, at about 800 feet above ground level (agl). The track of the balloon was to the west, across the Albany electricity sub-station, and then along the main high-tension power line for about 9 km, to the vicinity of Riverhead.

1.5 On this part of the flight the ground below and ahead to Riverhead and the forest was visible, with some fog lying to the south in the Lucas Creek area and over Whenuapai. The pilot planned to make a landing when the balloon was clear of the power line, just past Riverhead, but was unable to find a suitable landing place.

1.6 As the balloon passed further to the west of Riverhead, at 500 to 600 feet agl, the fog increased to substantially cover the ground below, but horizontal visibility remained clear above the fog. A low hill just south of Waimauku protruded clear of the fog and appeared to lie on track some 5 km ahead, so the pilot planned to land the balloon there.

1.7 After travelling further towards the Waimauku area it became evident that the track of the balloon would pass to the north of the hill, but might allow a landing in the Waimauku School grounds. The main features of Waimauku were then visible through the fog ahead, so the pilot commenced a slow descent.

1.8 As the balloon neared Waimauku the pilot saw a potential alternative landing area which he allowed the balloon to approach, descending more quickly from about 200 feet agl. During this descent, which took the balloon into the layer of fog, the track of the balloon changed towards the right, as a result of a local south-east wind at that lower level.

1.9 This track change took the balloon towards the adjacent State Highway 16 and away from the landing area. The pilot, on seeing the path of the balloon was towards the road and the power line alongside it, heated the balloon with both main burners to go around from the approach. This action arrested the descent, but not before it reached the height of the power line, which was contacted by the bottom of the basket before the balloon started to climb away.

1.10 One of the six conductors was picked up by the basket in mid-span and dragged off the insulators for four spans before it fell onto the road. The district power supply was tripped at 0828 hours, and was subsequently restored at 1130 hours.

1.11 The balloon was undamaged and the occupants unhurt, although shaken by the event. After climbing to about 900 feet from the applied heat, the pilot stabilised the balloon's altitude and then made a normal landing in a field some 3 km west of Waimauku.

1.12 The total flight time was 1.4 hours, and after landing the gauges in the four fuel tanks indicated that a total of 11% fuel remained. The individual tanks indicated 5%, 7%, 11% and 22% respectively. The pilot had been aware of his limited remaining fuel, and was concerned to make a landing without undue delay.

1.13 The fuel tanks were each of a nominal "60 litre" size, with a usable capacity of 54.1 litres, giving a total capacity of 216.4 litres. The four tanks were refuelled the next day, taking 169 litres of LPG to fill. When in use, two tanks at a time were connected to the two burners. Changing a tank involved closing the tank valve, bleeding the hose, then unscrewing and reconnecting it to the next tank before opening the new tank valve and re-igniting the burner.

1.14 The general weather situation was that a large slow moving anticyclone lay over New Zealand, with its centre over South Island. This gave the Auckland region clear settled conditions with light easterly winds.

1.15 A witness in Waimauku observed that the fog had thickened at about 0800, before clearing at about 0900 hours.

1.16 The pilot's normal source of pre-flight weather information was the Nowcasting Service provided by the Coast Guard. He had in addition, for a number of years, obtained the current Whenuapai TAF (aerodrome forecast) and METAR (aviation routine weather report) by telephone from the Airways Corporation National Briefing Office. From January 1997 the Briefing Office denied him this information, giving "military restrictions" as the reason. The information remained available in flight, however, but not before flight.

1.17 The National Briefing Office had been developed by Airways Corporation to provide a simple but comprehensive, largely automated pre-flight pilot briefing-on-demand facility for general aviation. Information provided included Notams and general aviation weather forecasts and reports covering the whole of New Zealand, as appropriate for a particular request. From early 1997, however, the Whenuapai and Ohakea weather information was no longer available from the National Briefing Office for pre-flight briefings.

1.18 Information provided to the Commission by Airways Corporation, MetService and the Royal New Zealand Air Force failed to provide a cohesive explanation of how and why the Whenuapai and Ohakea weather information had ceased to be available for pre-flight briefing purposes.

2. Analysis

2.1 Two important decisions which balloonists must make before flight are the choice of launch site, and whether to commence the flight given the current information on the local weather and the likely route to be followed.

2.2 In this case the general weather situation was obviously settled, with clear conditions and light easterly winds. The pilot checked the local winds by pilot balloon ascents, and found that the direction and speed were suitable. His observations were of clear weather locally and downwind. He was aware of patches of shallow radiation fog in valleys, but this is common at dawn after a clear Autumn night. Broken patches of fog should not have been a problem provided the balloon had a good margin of fuel endurance to allow the pilot a wide choice of when and where to land.

2.3 The chosen launch site gave the pilot an expected flight path over familiar terrain which offered a number of potential landing sites. The balloon's exact track, which followed the main power line for about 9 km, would not have been predictable, but it effectively precluded an early landing on this flight. Apart from this unpredictable factor, the launch site was suitable, and a different site would not have been obviously better.

2.4 Once the flight was under way, its conduct depended on the pilot's in-flight decisions. These would be determined principally by the initial aim of a flight of about an hour, by the observed weather, by the speed of progress of the balloon over the ground, and by the availability of suitable landing areas.

2.5 On the incident flight two events conspired to preclude an early landing. These were the balloon's track along the power line for the first 9 km and then the unavailability of a landing area between Riverhead and the start of the foggy area. With the fog visible ahead, the pilot would have landed had this been practicable, but he was constrained to continue above the fog layer towards Waimauku.

2.6 The pilot's plan to land in the Waimauku School grounds was reasonable, as was his modified plan to land just before Waimauku, but the wind shift to the right as the balloon descended into the top of the fog was a complication which led to his missing the approach. The descent rate had been increased for the approach before the wind shift started to affect the balloon, and this descent rate required maximum heat to go around when the need became apparent. The combination of the balloon's height and position at the start of the go around and the reduced heat available from both burners meant that the power line along the roadside could not be avoided.

2.7 The go-around could have been facilitated by the pilot making an earlier decision, and by having more heat available from the burners to improve the response of the balloon. The need for an earlier decision to go around may not have been apparent in the circumstances of reduced visibility, and the pilot probably reacted as soon as he was able to perceive the situation.

2.8 It is possible, however, that more heat could have been available if the pilot's management of the fuel tanks had been different. The fuel tanks had been pressurised with nitrogen before the flight, in keeping with normal practice. However, as the fuel level in a tank falls below about 25% the residual pressure decreases significantly, especially when using LPG with a significant butane content and thus lower vapour pressure. This reduces the flow of liquid fuel to the burner, and hence reduces the size of the flame and the heat output available.

2.9 The pilot had left 5% and 7% of fuel in the first two tanks when he changed over to the other full tanks. These tanks were probably also becoming depleted when the approach and go-around was made, and thus would have had reduced pressure available. A better tactic would have been to use all the fuel in the first tanks while the balloon was in cruising flight and unlikely to require maximum heat, in order to have the total residual fuel in the two tanks in use. The increased fuel level in those tanks would have optimised the pressure, and thus the heat available for manoeuvring on the approach to the ground. An additional benefit from running the first tanks out completely would have been that all the remaining fuel was in the tanks in use, making it simpler and more accurate to estimate the remaining endurance and easier to use the total fuel remaining, if necessary, without having to change over fuel hoses again.

2.10 A further tactic which the pilot could have used to increase the heat available to arrest the descent was to turn on the "whisper burner" valves as well as the main burner valves. The increased fuel flow through the two systems in each burner would have increased the heat output by a small amount, depending on the residual pressure, and might have made it possible to avoid the power line.

2.11 The pilot's concern to make a landing without undue delay was proper, given the fuel gauge indications of remaining endurance. This concern, however, may have led him to persist with his landing approach longer than he might in more favourable circumstances, and thus had the potential to be a factor in the incident. The actual fuel remaining, as evidenced by the amount required to refuel afterwards, was 46 litres, or 21%, so the urgency to land may not have been as great as he perceived at the time. The modified fuel management procedure suggested above could have relieved the pilot of some concern by enabling a more accurate assessment of the fuel remaining.

2.12 A useful tactic to increase the fuel endurance when circumstances make this desirable is to use a spare tank of fuel on the ground for the inflation, then reconnect to the balloon's full tanks before lift off. This may increase endurance by up to about 15 minutes. The balloon company planned to adopt this procedure after this incident.

2.13 The absence of the Whenuapai TAF and METAR information from the National Briefing Office probably did not affect the pilot's pre-flight decision-making or his conduct of this flight, because he had been able to observe the local weather and had received advice of fog patches from the Whenuapai air traffic controller. The general non-availability of this information for pre-flight briefing for other pilots was of concern, however, because such information is a basic necessity for flight safety. In this case, the whole of the flight was in the Whenuapai Control Zone, so the Whenuapai weather information was the most appropriate for the flight.

2.14 The difficulty found in getting any cohesive information on how or why this information had been withdrawn from pre-flight briefing material was of further concern, because it had implications for any future retrenchment of other aviation weather information. Recommendations were accordingly made to the Director of Civil Aviation that he take steps, with the relevant parties, to have reinstated the supply of Whenuapai and Ohakea weather information through the National Briefing Office; and to institute a system to monitor the continuing adequacy and availability of general aviation weather information.

3. Findings

3.1 The duration of the balloon flight was extended because of fog obscuring the ground below.

3.2 An approach to land in foggy conditions was aborted because of a wind shift.

3.3 The go-around manoeuvre from this approach was insufficient or too late to prevent the balloon from contacting the power line.

3.4 The pilot's concern about the fuel endurance remaining may have led him to persist with the landing approach.

3.5 Modified fuel management procedures could have given more heat for manoeuvring the balloon, and enabled a more accurate estimation of the remaining fuel endurance.

3.6 The non-availability of Whenuapai weather information for pre-flight briefing did not affect this incident.

3.7 The general non-availability of Whenuapai and Ohakea weather information was a recent development with a potential for compromising flight safety which should be rectified without delay.

4. Safety Recommendations

4.1 It was recommended to the Director of Civil Aviation that he:

4.1.1 Take steps, in concert with other appropriate organisations to have reinstated the supply of Whenuapai and Ohakea weather information for pre-flight briefings through the Airways Corporation National Briefing Office. (048/97); and

4.1.2 Institute a system to monitor the continuing adequacy and availability of general aviation weather information. (049/97)

4.2 The Director of Civil Aviation responded as follows:

4.2.1 CAA adopts the recommendation as it believes that work presently under way, in conjunction with MetService and others, to address the lack of information in the Northland region, including Whenuapai, will ultimately render a greater level of real time meteorological information. It is anticipated that the principles of the recommendation will be implemented within six months.

4.2.2 CAA adopts the recommendation as it believes that having a number of Field Safety Officers whose responsibilities indirectly include the monitoring of adequacy and access to general aviation meteorological information in their given regions already meets the intent of the recommendation and that implementation has already been accomplished.

18 August 1997

Hon. W P Jeffries
Chief Commissioner