Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY REPORT
Aviation Occurrence Investigation
AO-2010-033
Final

Wirestrike
37 km SSW Latrobe Valley Airport, VIC
20 May 2010
VH-OSU, Bell Helicopter 206L LongRanger III

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Figures 2 & 3: Google Earth.
Figure 4: Christine Redmond.
Figure 5: Helimission.

Abstract

At about 1253 Eastern Standard Time on 20 May 2010, a Bell Helicopter Company 206L LongRanger III helicopter, registered VH-OSU, commenced forestry spraying operations about 37 km south-south-west of Latrobe Valley Airport, Victoria. At about 1354 the pilot commenced a final spray run that resulted in the helicopter's flightpath crossing a powerline that was known to the pilot. The helicopter contacted the wire, seriously damaging the helicopter's flight control system and main rotor mast, which likely rendered it uncontrollable. The helicopter subsequently impacted the ground. The pilot was fatally injured.

The investigation found that it was likely that the pilot failed to recall the existence of the wire. The inherent difficulty of visually detecting the wire, combined with the operating groundspeed, meant that the pilot would not have had sufficient time to avoid the wire after seeing it. An examination of the wreckage of the helicopter did not find any mechanical abnormalities that might have contributed to the accident.

No permanent or temporary high visibility devices were attached to the powerlines, nor were they required to be. The helicopter was not fitted with wirestrike protection system (WSPS) equipment, nor was it required to be by aviation regulation. The investigation was unable to determine if a WSPS might have altered the outcome of the wirestrike.

As a result of this accident, Energy Safe Victoria issued a wire safety alert to aerial work operators and infrastructure providers. The Australian Transport Safety Bureau (ATSB) issued a Safety Advisory Notice to Energy Networks Australia and operators and pilots that are involved in low-level operations. The notice suggested that, where wires exist in areas where low-level activity occurs, operators and pilots consider the need for any powerlines to be marked in accordance with AS 3891.2, 2008, Part 2: *Marking of overhead cables for planned low level flying operations*. In addition, the ATSB has published an educational report aimed at increasing awareness among low-level operators and those agencies organising such activities. The ATSB has also commenced a research investigation that seeks to more fully understand the wirestrike risk in Australia.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated. The terms the ATSB uses to refer to key safety and risk concepts are set out in the next section: Terminology Used in this Report.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes it appropriate. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives

TERMINOLOGY USED IN THIS REPORT

Occurrence: accident or incident.

Safety factor: an event or condition that increases safety risk. In other words, it is something that, if it occurred in the future, would increase the likelihood of an occurrence, and/or the severity of the adverse consequences associated with an occurrence. Safety factors include the occurrence events (e.g. engine failure, signal passed at danger, grounding), individual actions (e.g. errors and violations), local conditions, current risk controls and organisational influences.

Contributing safety factor: a safety factor that, had it not occurred or existed at the time of an occurrence, then either: (a) the occurrence would probably not have occurred; or (b) the adverse consequences associated with the occurrence would probably not have occurred or have been as serious, or (c) another contributing safety factor would probably not have occurred or existed.

Other safety factor: a safety factor identified during an occurrence investigation which did not meet the definition of contributing safety factor but was still considered to be important to communicate in an investigation report in the interests of improved transport safety.

Other key finding: any finding, other than that associated with safety factors, considered important to include in an investigation report. Such findings may resolve ambiguity or controversy, describe possible scenarios or safety factors when firm safety factor findings were not able to be made, or note events or conditions which 'saved the day' or played an important role in reducing the risk associated with an occurrence.

Safety issue: a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operational environment at a specific point in time.

Risk level: The ATSB's assessment of the risk level associated with a safety issue is noted in the Findings section of the investigation report. It reflects the risk level as it existed at the time of the occurrence. That risk level may subsequently have been reduced as a result of safety actions taken by individuals or organisations during the course of an investigation.

Safety issues are broadly classified in terms of their level of risk as follows:

- **Critical** safety issue: associated with an intolerable level of risk and generally leading to the immediate issue of a safety recommendation unless corrective safety action has already been taken.
- **Significant** safety issue: associated with a risk level regarded as acceptable only if it is kept as low as reasonably practicable. The ATSB may issue a safety recommendation or a safety advisory notice if it assesses that further safety action may be practicable.
- **Minor** safety issue: associated with a broadly acceptable level of risk, although the ATSB may sometimes issue a safety advisory notice.

Safety action: the steps taken or proposed to be taken by a person, organisation or agency in response to a safety issue.

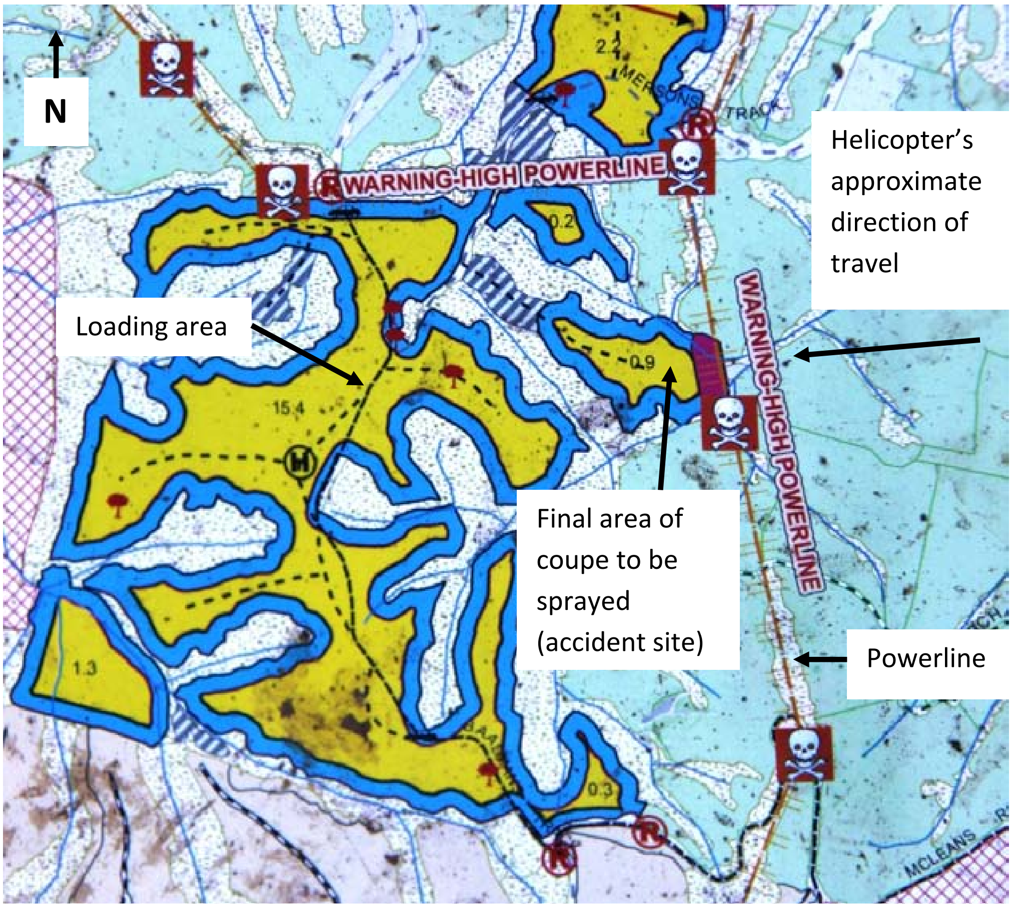
FACTUAL INFORMATION

History of the flight

On 20 May 2010 at about 0830 Eastern Standard Time[1], a Bell Helicopter Company 206L LongRanger III helicopter, registered VH-OSU (OSU), departed Flynn Depot, Traralgon, Victoria to conduct aerial spraying operations in a forestry plantation in the Strzelecki Ranges to the south of Latrobe Valley Airport, Victoria.

Before commencing spraying, the forestry site controller, who was supervising spraying operations, briefed the pilot of OSU and another company pilot on the spraying requirements, including the layout of the forestry coupes[2] and their associated hazards, such as powerlines. As part of that briefing, the forester provided the pilot with detailed coupe maps, including a map of the occurrence coupe (Figure 1).

Figure 1: Map of the Baalmans Road coupe that was recovered from the accident site



1 The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time (EST), as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

2 Coupe – An area of woodland that has been or is planned for clear felling.

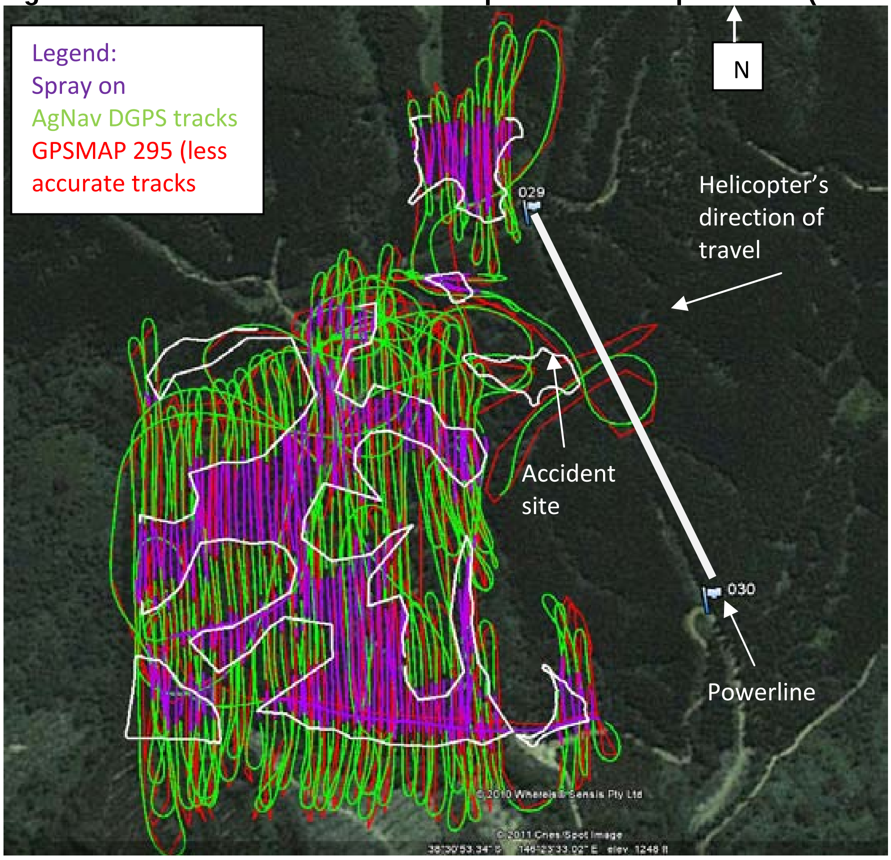
At about 0904, the helicopter arrived in the Loop Road Cable forestry coupe to commence spraying operations for the day. After completing aerial spraying in that area at 1021, the pilot repositioned to the Schmidts Road coupe and commenced spraying at 1036. On completion of spraying that coupe at about 1100, the pilot repositioned to the Little John coupe and commenced spraying at 1124. The pilot completed spraying that coupe at 1138 and then repositioned to the Baalmans Road coupe (Figure 1), which was located 37 km south-south-west of Latrobe Valley Airport.

After completing an aerial reconnaissance of the area, the pilot landed, shut down the helicopter, had lunch and waited for the ground crew to arrive. When the forestry site controller arrived at the coupe, he briefed the pilot again and pointed out the powerlines at the work site before the spraying commenced.

At about 1253, the pilot commenced spraying the Baalmans Road coupe. Spraying continued for about an hour with chemical and fuel being replenished as required from the loading area (Figure 1).

The planned spray runs had been programmed into OSU's AG-NAV[3] Global Positioning System (GPS) tracking device in preparation for the task and during the spraying, the pilot successfully negotiated a number of hazards that included large trees and the powerline that was ultimately struck. That powerline ran along the eastern perimeter of the coupe and was aligned in a north-north-west to south-south-east direction (Figures 1, 2 and 3).

Figure 2: AG-NAV GPS tracks and the position of the powerline (in bold white)



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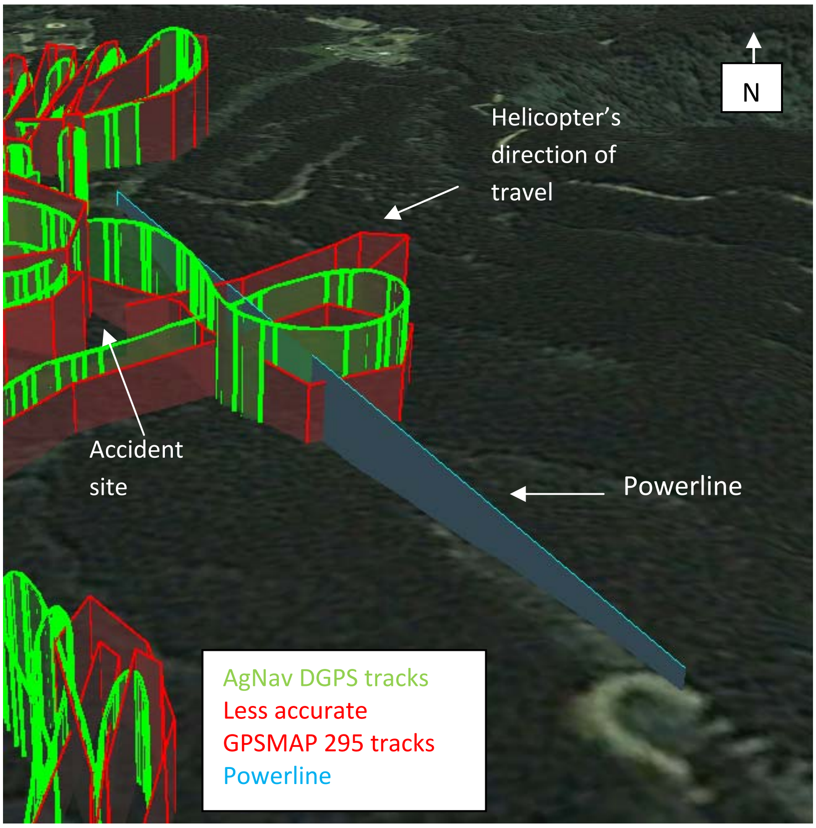
3 The AG-NAV differential GPS (DGPS) guidance system is a visual guidance tool that allows pilots to spray precise patterns within a defined spray area.

Some time before 1354, the pilot completed spraying the northern area of the coupe and repositioned to spray the small remaining area of the coupe. The course selected for the spray run crossed a powerline that was known to the pilot both from previous briefings by the forestry site controller, and probably from the pilot's earlier aerial reconnaissance of the coupe.

The pilot overflew the powerline three times while preparing to spray the final area of the coupe (Figures 2 and 3). Moreover, recorded information showed that the pilot last flew in the vicinity of the powerline within 1 minute of the wirestrike.

Figure 3: Vertical profile of the helicopter's track, indicating that the helicopter crossed the powerline at least twice just before the wirestrike



At 1354, the helicopter collided with and severed the powerline adjacent to the eastern boundary of the coupe before impacting the ground. The pilot was fatally injured and the helicopter was seriously damaged.[4] The ground support crew attended the accident site and contacted emergency services.

Pilot information

The pilot held an Australian Commercial Pilot (Helicopter) Licence that was issued on 28 October 2009 in accordance with the Trans Tasman Mutual Recognition Act 1997 and reflected, in part, his New Zealand flight crew licence and qualifications. The licence was endorsed with the Bell 206 helicopter type. The pilot also held an

4 The *Transport Safety Investigation Regulations 2003* define 'serious damage' as including the 'destruction of the transport vehicle.'

Australian Class 1 Medical Certificate with the restriction that reading correction be available when exercising the privileges of the licence.

The pilot's Australian licence did not contain a helicopter agricultural rating, even though the pilot's Australian licence application included a request for recognition of his New Zealand Grade 1 Agricultural Rating.[5] In addition, the pilot did not hold the required Pilot (Chemical Rating) Licence[6] issued by the Victorian Department of Primary Industries, or any other equivalent Australian State issued chemical rating.

The pilot also held a current New Zealand Commercial Pilot Licence (Helicopter) endorsed with the Bell 206 helicopter type. The pilot's New Zealand licence included a Grade 1 Agricultural Rating and a Category E helicopter flight instructor rating that permitted the pilot to instruct pilots for the issue of topdressing, spraying and type ratings on agricultural aircraft.

According to entries in the pilot's flying logbook, recent work sheets, and other records, the pilot's total aeronautical experience at the time of the occurrence was probably more than 5,125 flying hours of helicopter flying time. The operator reported that the pilot had about 1,200 hours in Bell 206 helicopters and that the pilot had accrued more than 3,000 hours in aerial spraying using differential GPS (DGPS) spray guidance systems. The pilot's most recent flight check was conducted on 16 May 2010 by the operator's chief pilot. The check took the form of a competency/proficiency check on the Bell 206L-3 helicopter to prepare the pilot for forestry application work. All sequences were recorded as flown to a satisfactory standard.

In September 2008, the pilot sustained a wirestrike during agricultural spraying operations in New Zealand in which he sustained serious injuries. He recovered sufficiently to be re-issued with a New Zealand Class 1 Medical Certificate, albeit with restrictions. Those restrictions included that lookovers or reading spectacles be readily accessible while using the New Zealand Civil Aviation Authority medical certificate and that, as a result of the injuries sustained in that wirestrike accident, the pilot was only permitted to fly those helicopters on which he had been fully assessed to fly by a qualified flight testing officer. There were no reports that the pilot had any difficulty operating the helicopters he was endorsed to fly.

Aircraft information

The Bell 206L-3 is a seven-seat, single main and tail rotor-equipped helicopter that is powered by a gas turbine engine, and equipped with skid-type landing gear (Figure 4). The helicopter was fitted with chemical spray equipment. It was not fitted with a wirestrike protection system (WSPS) and there was no regulatory requirement requiring the installation of such a system.

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[5] This appeared to have been an administrative oversight.

[6] Required by the *Agricultural and Veterinary Chemicals (Control of Use) Act 1992*. Aerial spraying must not be carried out unless the pilot of an aircraft holds a current Pilot (Chemical Rating) Licence (note: interstate PCRLs are recognised in Victoria) and the pilot is either an employee of an Agricultural Aircraft Operator Licence holder or holds this licence themselves.

The helicopter was imported into Australia from Japan in early 2010 and was issued an Australian Certificate of Registration on 7 April 2010 and an Australian Certificate of Airworthiness on 19 April 2010. With some exceptions, the helicopter was certified, equipped, and maintained in accordance with existing regulations and approved procedures. Those exceptions included that at the time of the accident there was no documentary evidence to confirm that a main rotor re-torque and swashplate friction check had been completed in accordance with the required maintenance schedule. There was also no documentary evidence to indicate that the AG-NAV GPS spray guidance unit, spray gear and associated systems were installed in accordance with approved data. However, on-site examination of the helicopter indicated that the non-completion of overdue routine maintenance items did not contribute to the development of the accident.

Figure 4: Bell 206L-3 without the chemical spray equipment fitted

Source: Christine Redmond.

The recovered AG-NAV GPS data indicated that the unit powered off about 30 seconds before the wirestrike. In addition, the AG-NAV circuit breaker was found in the open position, possibly as a result of impact forces or an electrical problem. It was unknown if the unit powered off because of a technical problem or for some other reason. That powering off of the unit would not have prevented the pilot finishing the operation, albeit with less accuracy.

Wirestrike protection system

A wirestrike protection system (WSPS) is available for the Bell 206L helicopter under an approved Supplemental Type Certificate (STC). The occurrence helicopter was due to be fitted with a WSPS in June 2010. A WSPS is designed to prevent entry of a wire into the cockpit area, reduce the possibility of flight control damage during a wirestrike, and decrease the probability of wires becoming entangled in the landing gear.

The system comprises a windshield deflector, and upper and lower deflector and cutter assemblies (Figure 5). The windshield deflector/guide serves to move the wire over the cockpit area and into the cutters. Forward speed, cable tension, strike angle and pilot reaction are some of the factors that affect the efficacy of a WSPS.

In particular, a major WSPS manufacturer advised that the system is effective in the following circumstances:

- helicopter forward velocity range from 24 km/h to 96 km/h
- impact angle between the flightpath and the wire (strike angle) from 60˚ to 90˚
- aircraft pitch attitudes at impact from 5˚ nose down to 5˚ nose up
- angle of yaw at impact: 30˚ at 24 km/h and 15˚ at 96 km/h
- critical wire diameter of 10.0 mm (1 x7 steel strand wire)
- cable spans up to 61 m.

The wire impact marks on the mast and pitch links, and the ground crew's reports of the helicopter's pitch attitude in flight indicated that the wire would probably have passed above the upper deflector of a typical WSPS installation on a high skid gear-equipped Bell 206L. In addition, the occurrence wire span exceeded the length upon which a typical WSPS was considered effective.

Figure 5: High skid-landing gear-equipped Bell 206L-3 with WSPS fitted

Source: Helimission.

There are currently a number of engineering solutions available, with the potential to assist pilots to identify overhead powerlines.[7] While their suitability or cost-effectiveness may not prove acceptable for all helicopter types or operations, those engineering solutions may help reduce the risk of a wirestrike further.

Powerline information

The powerline lay approximately perpendicular to the helicopter's flightpath (Figures 1, 2 and 7). The 703 m span powerline comprised three strands of 2.75 mm galvanised interwoven steel supported by two power poles. The northern or lower

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[7] Nagaraj, V. T., & Chopra, I. (2008). *Safety study of wire strike devices installed on civil and military helicopters* (DOT/FAA/AR-08/25). Springfield, VA: FAA.

power pole was concrete and 12.5 m in height and the upper, or southern pole was wooden and 10.7 m high. The poles were located at the ends of a partially overgrown cutting, in heavily-timbered terrain (Figure 7). The line was erected in 1970. The point at which the powerline was severed by the helicopter was estimated to be about 186 m from the northern pole, 5.8 m above the tree line and 46.9 m above ground level (AGL).

Transfer markings were evident on the conductor in the area adjacent to the break in the wire (see *Wreckage and impact information* section). Those markings corresponded with score marks on the helicopter's main rotor mast and pitch links (Figure 6).

Figure 6: Powerline wrapped around the helicopter's main rotor mast[8]

Requirement to mark powerlines

The Australian Standard (AS) 3891.1[9] stipulated that any section of cable that had a height in excess of 90 m above a road, railway or navigable waterway should to be marked. Cables above 90 m located in other places should be marked if they had a continuous span greater than 50 m.

In this case, permanent markers were not mandatory for the powerline that was struck by the helicopter.

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[8] Wire not in the as found position. Indicative position displayed.

[9] Australian Standards AS 3891.1, 2008, *Air navigation—Cables and their supporting structures—Marking and safety requirements: Part 1: Permanent marking of overhead cables and their supporting structures for other than planned low level flying.*

In addition, AS 3891.2[10] section 1 titled *Scope* stated:

> This Standard specifies requirements for permanent and temporary marking of overhead cables and their supporting structures for visual warnings to pilots of aircraft involved in intentional and legal low-level flying operations. Typical flying operations include aerial application, mustering, power line inspection, media and ballooning.
>
> Markers specified in this part of the Standard are designed on the assumption that a pilot undertaking intentional and legal low-level flying is familiar with the obstacles in the area involved and requires only a visual reminder of the exact location of the cables.
>
> NOTE: Appendix A provides guidance on the installation of markers.

The AS included as examples: powerlines in areas where aerial spraying activities took place, if the powerlines were positioned near trees, or if the powerlines cut across the corner of a paddock that rendered them difficult to see.

Appendix A to the AS stated, for information and guidance, that 'Markers should be installed where regular low-level flying operations take place' and that responsibility for the installation of markers rests with the person requesting the planned low-level flying operations. However, the pilot or pilot's delegate was required to be satisfied as to the need for and the effectiveness of the markers, prior to commencing spraying operations.

The plantation owner advised that they did not consider using temporary markings for spray operations as the forest was treated from the air two or three times during a typical 30-year period. Also, they reported that previous request to have powerlines marked had not been well received by powerline operators. Their preference was not to use aerial spraying in hazardous areas and to have such areas treated by ground parties to reduce risk. The plantation owner left it to the operator/individual pilot's discretion to not to spray an area due to any wire hazards.

Meteorological information

The forestry site controller and the ground support crew reported that there were overcast conditions in the vicinity of the application area that day. A shower had passed through the area before the accident but the visibility was reported as good at the time of the occurrence. The site controller's weather records indicated nil wind at the time of the occurrence.

The 1400 METAR[11] for Latrobe Valley Airport was consistent with the weather assessments of the forestry site controller and ground support crew around the time

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10 Australian Standards AS 3891.2, 2008, *Air navigation—Cables and their supporting structures—Marking and safety requirements: Part 2: Marking of overhead cables for planned low level flying operations.*

11 Routine aerodrome weather report issued at fixed times, hourly or half hourly.

of the accident. The METAR included nil wind, visibility 10 km or more, broken[12] cloud at 7,700 ft and an overcast ceiling of 8,900 ft.

The aerodrome forecast (TAF) for Latrobe Valley Airport issued at 1042 indicated that from 1300 the wind was south-westerly at 7 kts, visibility 10 km or more, light rain showers, scattered cloud at 1,500 ft and broken cloud at 4,000 ft. The forecast also included intermittent[13] changes between 1400 and 2400 in which the visibility reduced to 4,000 m with rain showers and broken cloud was anticipated at 1,000 ft.

The relevant amended ARFOR[14] issued at 0732 indicated that a trough was due to pass through the area of operations later in the day. At about the time of the occurrence, the trough was still south of the area of operations but convective activity with patches of significant cloud and rain showers could be expected in that area consistent with the TAF for Latrobe Valley Airport.

The wreckage distribution, GPS data and ground crew reports indicated that the helicopter was being flown on a westerly heading of about 265° true (T). The sun's azimuth[15] at that time was 332° T and its elevation[16] about 26°.[17] The sun would have been about 67° to the right of the helicopter's direction of flight as it approached the powerline. The overcast conditions at the time were consistent with the sun not being visible at the time of the occurrence.

Communications

Spraying operations required the pilot to be in regular contact with the forestry site controller and with the ground support crew. The helicopter was fitted with ultra high frequency (UHF) and very high frequency (VHF) radios. It was reported that the UHF radio was the primary method for coordinating the loading of chemicals and to relay any requirements between the pilot and the forester.

The ground support crew reported that there were no ground-air communications with the pilot immediately before the wirestrike.

Wreckage and impact information

The accident occurred over sloping terrain at an elevation of 1,258 ft above mean sea level (AMSL) (Figure 7). The wreckage distribution and ground impact marks were consistent with the helicopter impacting the ground with significant vertical

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[12] Cloud amounts are reported in oktas. An okta is a unit of sky area equal to one-eighth of total sky visible to the celestial horizon. Few = 1 to 2 oktas, scattered = 3 to 4 oktas, broken = 5 to 7 oktas and overcast = 8 oktas.

[13] Intermittent (INTER) – indicates changes expected to occur frequently for periods of less than 30 minutes duration, with the conditions fluctuating almost constantly between the times specified in the forecast.

[14] Area forecast – routinely-issued forecasts for designated areas.

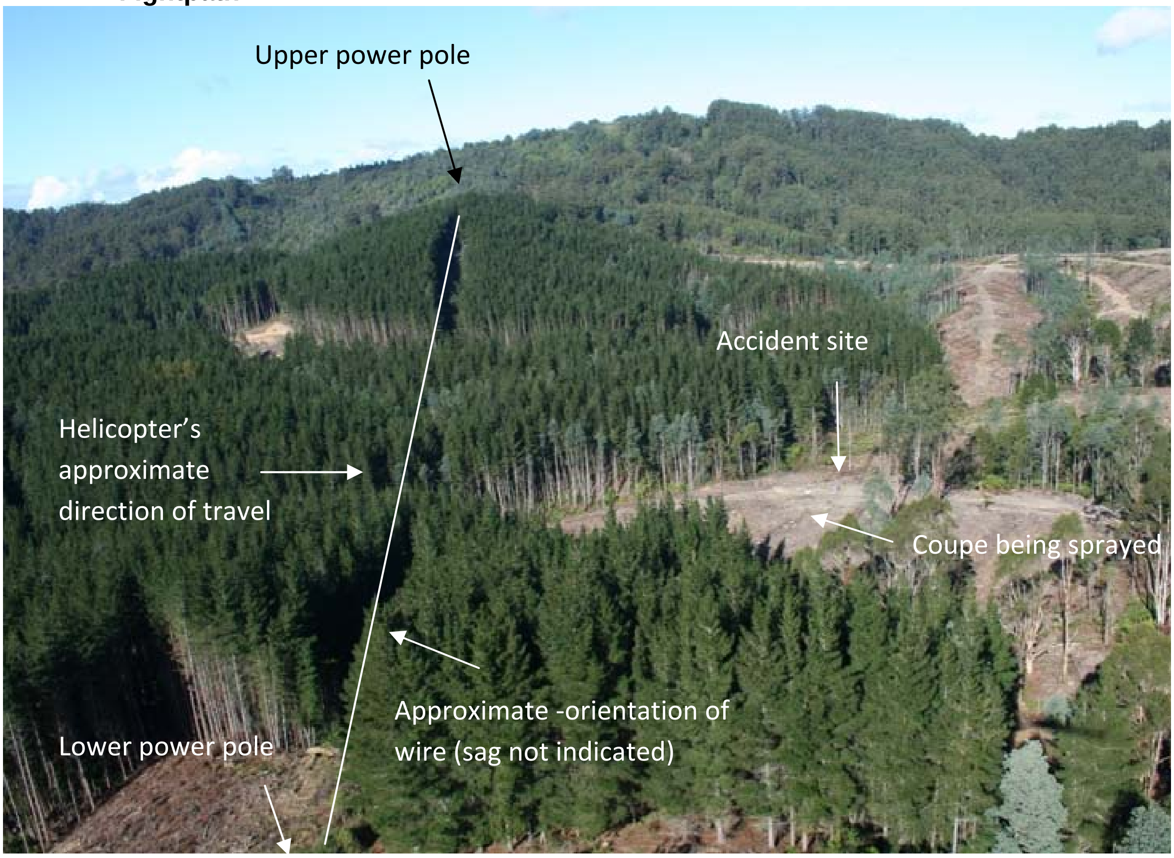
[15] The clockwise angle from the sun to true north, measured in degrees.

[16] The vertical angle to the sun from an ideal horizon, measured in degrees.

[17] Determined from the Geoscience Australia web site www.ga.gov.au

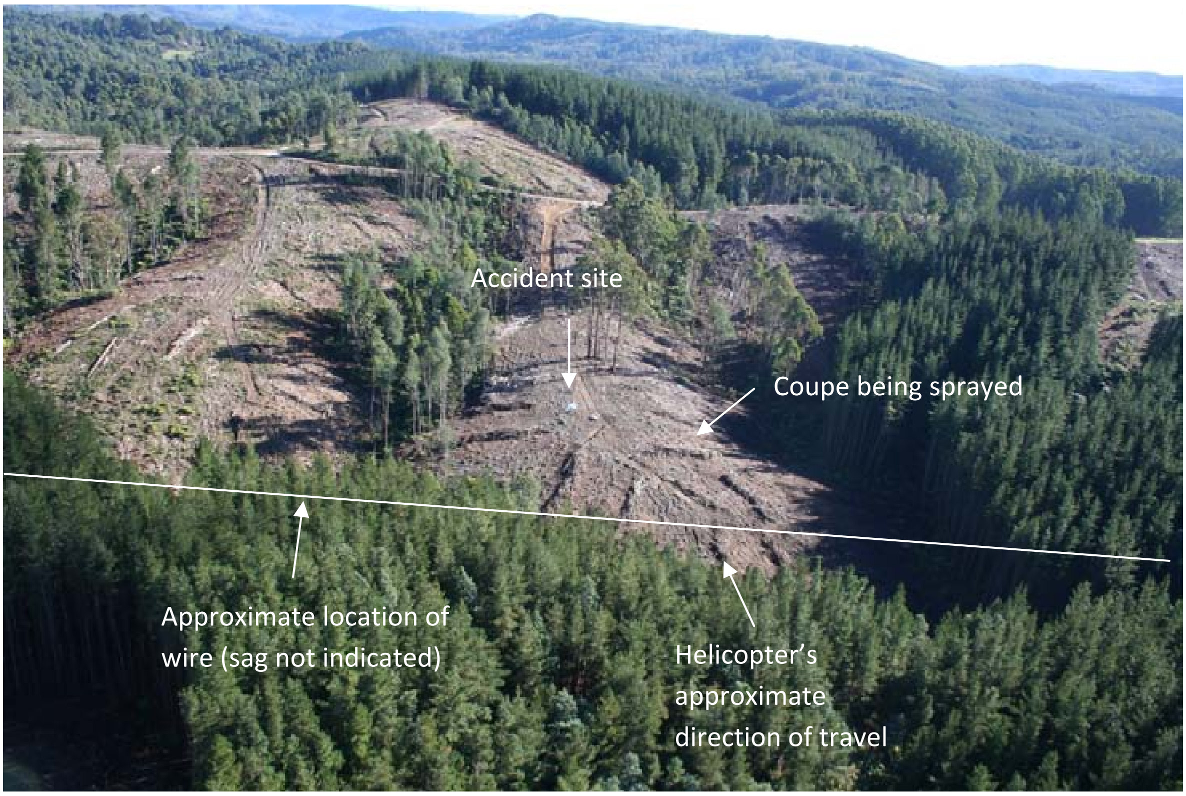
and moderate forward speed in a right side-low, steep nose-down attitude after colliding with the powerline.

Figure 7: Aerial view of powerline, accident site and helicopter's approximate flightpath



There was little evidence of good visual cues being available to alert the pilot to the relative position of the wire. The investigation determined that, when viewed from the direction of travel, the upper power pole was totally obscured by large trees. The lower pole was also partly camouflaged by a cluster of large trees. Furthermore, the elevation of the terrain to the west (approach path direction) of the accident site was higher than the wire (Figure 8). That increased the risk of the wire blending into the background terrain.

Figure 8: Western perspective of the accident site



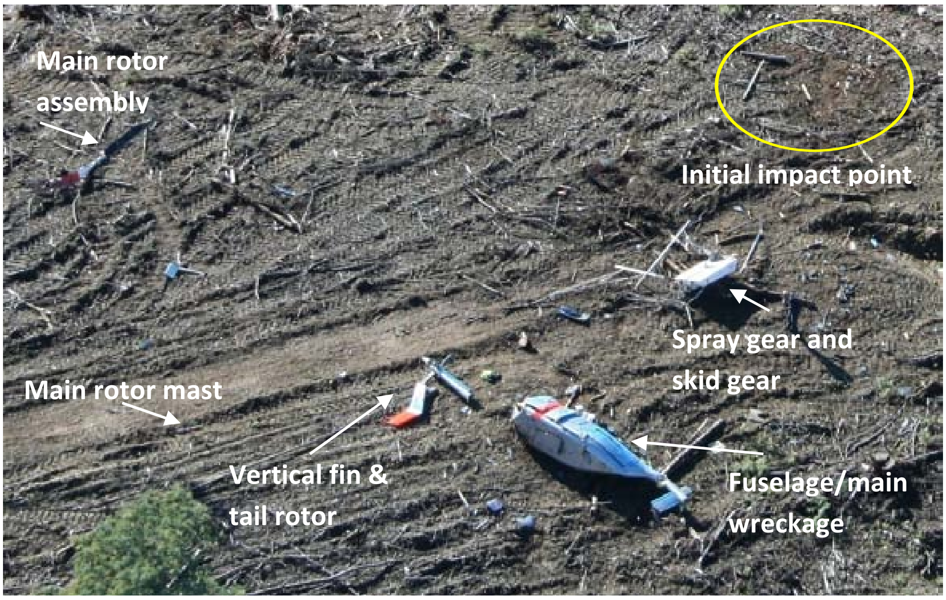
The helicopter was equipped with AG-NAV DGPS equipment that provided guidance to the pilot during the application of the chemical and a portable Garmin GPSMAP 295. Examination of the recorded GPS data log indicated that about 30 seconds before contacting the wire, the AG-NAV unit powered off for reasons that could not be established. Although less accurate, the Garmin GPSMAP 295 unit remained active until the impact with the wire and indicated that the helicopter had a groundspeed of 50 kts at that time.

Witness information and examination of the engine and associated components at the accident site indicated that the helicopter was operating normally before it contacted the powerline.

Impact damage to the helicopter was extensive (Figure 9). The helicopter came to rest on its right side, which exhibited significant deformation. There was severe disruption to the cockpit, and the instrument pedestal had been dislodged from the floor. As a result of the wirestrike and subsequent ground impact forces, the main rotor blades, mast, skid-landing gear, spray tank and tail boom had separated from the helicopter's fuselage but remained in close proximity to the main wreckage (Figure 10).

Figure 9: Overview of the main helicopter wreckage

Figure 10: Aerial perspective of the accident site, showing the initial impact point (circled) and main wreckage



Examination of recovered components

Examination of the wreckage indicated that the powerline passed between the top of the fuselage and main rotor disc and impacted the mast and flight control pitch change links (Figures 11 and 12). Examination of the mast revealed rotational scoring that commenced about 6 cm above the top surface of the swashplate drive collar (idler link to mast attachment point) and continued up the mast for about 19 cm (Figure 13).

Figure 11: Approximate point of impact of wire with mast and pitch links.

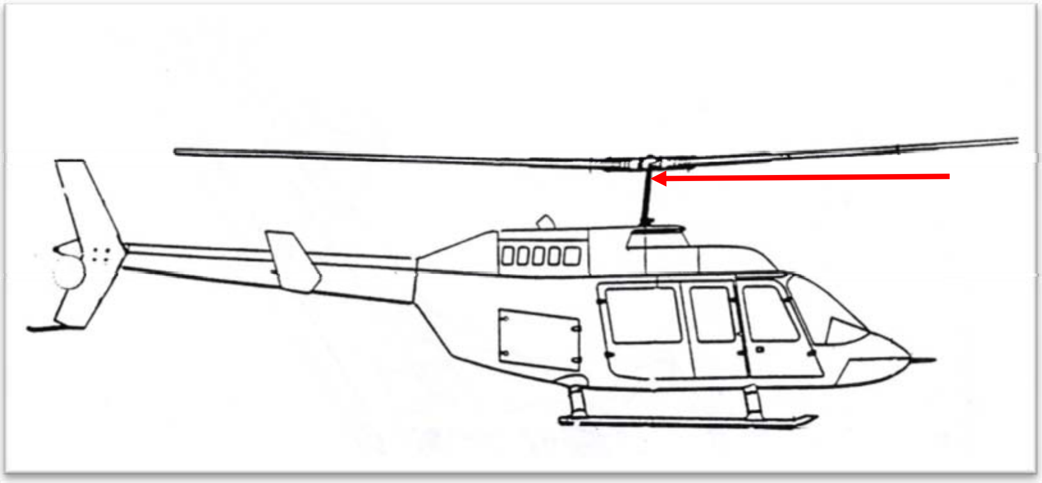


Figure 12: Approximate area of wire contact on mast and pitch change links and direction of main rotor rotation (red circle).

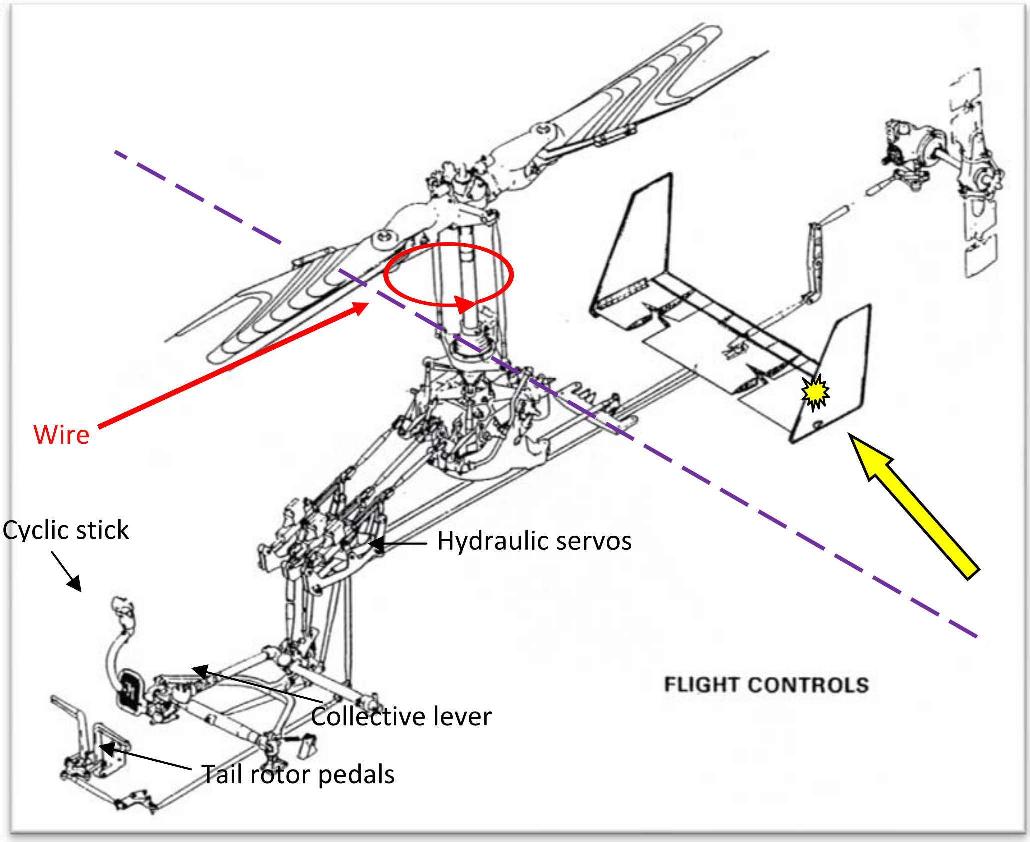


Figure 13: Main rotor mast showing the position of the scoring damage in relation to swashplate drive collar (the red arrow indicates the upper end of the shaft)

Following contact with the helicopter, the wire wrapped around the mast and pitch links (PCLs), bending the PCLs in toward or against the mast ('hourglassing') and fracturing both links as the helicopter moved forward.[18] The fractured sections of the PCLs showed evidence of multiple wire score marks (Figure 14). One of the PCLs showed evidence of indentation from the PCL having been pulled against the rotating main rotor mast prior to failure. All PCL fracture surfaces were of the bending overstress type.

Figure 14: Severed pitch links showing significant wire scoring

A section of coiled wire was found adjacent to the accident site impact point. That wire appeared to have been coiled or wound around a shaft and was of the same

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[18] The two 77.8 cm long PCLs, being securely attached at the top and bottom, would have been pulled in against the main rotor mast as the wire tightened, temporarily giving them a waisted or 'hourglass' shape before failing the PCLs completely.

type as the powerline wire still connected to the power poles. Examination of that coil of wire showed that the diameter of the coil was of the correct size to have been wound around the main rotor mast (see Figure 6). Examination of the inside surface of the coiled wire showed rubbing/scoring damage on the surface of the wire consistent with the angle and width of the scoring damage on the main rotor mast and PCLs.

The fractured ends of the wire also exhibited evidence of a ductile-tensile overstress failure.

The main rotor mast showed evidence of a significant mast bump that bent and failed the mast at a position 31 cm below the swashplate drive collar. It was not possible to determine if the mast failed shortly before the helicopter impacted the ground or during that sequence.

The main rotor assembly was found about 11.5 m to the right of the wreckage trail and at 90° to the initial main rotor blade slash marks on the ground. Both main rotor blades were bent downward at the outboard end of the blade reinforcing plates. Each of the blades had broken into several pieces, with all fracture surfaces exhibiting overstress. Those features were consistent with significant rotational force at impact.

The black paint finish on the underside of both main rotor blades showed evidence of scoring. That scoring exhibited a 'regular pattern' and appeared to have been the result of contact with the wire (Figure 15).

Figure 15: Wire scoring damage to the underside of one of the main rotor blades

There was evidence of a substantial blade impact(s) with the left auxiliary fin at the point at attachment on the end of the left horizontal stabiliser (see the yellow arrow and stylised impact mark at Figure 12). That impact caused the horizontal stabiliser and tab to fail in an upwards direction at a point about one third of that elevator's span away from the surface of the tail boom.

The mid-section of the left auxiliary fin had broken free from the helicopter following impact with the main rotor and was found about 55.5 m from the main wreckage to the right of the accident trail. A blue contact mark on one of the main rotor blades was consistent with that blade impacting the fin.

There was no evidence of any other impact between the main rotor blades and the tail boom assembly.

Medical and pathological information

The pilot's post-mortem and toxicology reports were benign in respect of their possible contribution to the development of the accident.

Survival aspects

A four-point restraint harness with inertia reel shoulder straps was fitted to the pilot's seat. Examination of the harness at the accident site revealed no evidence of failure of the locking mechanism. However, the pilot's harness attachment points had failed as a result of ground impact forces.

The pilot was wearing a helmet at the time of the occurrence. The helmet exhibited impact damage, but remained intact. The helmet visor protection assembly had detached from the helmet but the high visibility visor remained attached to the helmet and was found in the stowed position. It was unknown if the pilot was using that visor at the time of the occurrence.

The helicopter's Emergency Locator Transmitter (ELT) activated after impact.

Organisational and management information

Requirements for the conduct of low-level agricultural operations

The Civil Aviation Safety Authority (CASA) *Day (VFR[19]) Syllabus – Helicopters* outlined the requirements for various helicopter pilot licences. That syllabus included the limited exposure of trainee pilots to low-level operations and their associated hazards.

Additional low-level training for the issue of an agricultural rating was contained in Civil Aviation Order (CAO) 40.6 and required a pilot to satisfactorily complete a period of ground training that was followed by initial and operational flight training. After a period of supervised flying, the pilot was able to exercise the privileges applicable to the agricultural rating unsupervised.

During the initial agricultural pilot training, pilots were to be familiar with low-level operations in the vicinity of powerlines. Pilots were required to explain various planning and risk control strategies for application in the identification of hazards, including the effects of weather. Options to identify and then minimise the risks associated with the presence of powerlines included: conducting a preliminary inspection of the treatment area, being aware of the potential impact of in-flight

19 Visual Flight Rules (VFR). The rules prescribed by the civil aviation regulatory authority for visual flight.

distraction, and identifying visual cues associated with and maintaining awareness of previously-located powerlines.

There was no requirement for pilots to undergo formal training in wire awareness, or for helicopter pilots to conduct recurrent flight checks in agricultural operations.

While there were similarities to the equivalent New Zealand Civil Aviation Authority's (CAA) requirements for the issue of an agricultural pilot rating (helicopters), the CAA's training requirements for the initial issue of a Grade 2 agricultural rating (helicopters) exceeded the CASA requirements.[20]

Inspection of the treatment area

Operator's procedures

As part of the requirement to hold an air operator's certificate, the operator was required to have an operations manual that provided pilots and staff with a description of the operator's policies and procedures. The pilot had signed the operations manual 3 days before the accident, which indicated that he had read, understood and agreed to apply the procedures outlined in the manual.

The operations manual reinforced that flying operations were to be conducted in accordance with all CASA regulations and required pilots to carry out an aerial inspection of the proposed treatment area in order to identify all hazards prior to commencing agricultural operations. That included an assessment of the:

- boundaries of the treatment area
- location of any powerlines
- height and position of any other obstructions
- locations of occupied buildings
- slope of the ground and nature of terrain
- availability of forced landing areas in the application area.

There was also guidance in the operations manual on the planning and assessment of an application area. Pilots were also referred to the CASA *Agricultural Pilots Manual* (now called the Aerial Agricultural Association of Australia *Aerial Application Pilots Manual*) for more detailed information and were required to be familiar with that manual. It was unknown if the occurrence pilot had read that manual.

The AAAA manual stressed the risk of pilots striking wires that had already been located but were subsequently forgotten. The manual also highlighted that pilots should consider an additional hazards check before carrying out any cleanup runs, and advised pilots to concentrate on minimising their mental load during application flights and to avoid distractive influences.

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[20] New Zealand CAA Advisory Circular AC 61-15.

Forestry site controller briefing

Prior to commencing the aerial spraying operations, the plantation owner's site controller completed a site assessment of the intended spray area. That assessment identified residential developments, environmentally sensitive areas, roads, powerlines and other hazards that might affect the application. The layout of the spray area was also charted on a topographical map.

The site controller discussed the area with the pilot before operations commenced for the day and again on-site. To ensure all items were briefed appropriately, and that the area to be sprayed was correctly identified, a site map that highlighted the area was provided to the pilot. That map included the hazards affecting the intended operation and was used to ensure the completeness of the discussion. All relevant features and hazards were marked on the maps (Figure 1).

Additional information

Spraying procedures

It was reported that the typical spray procedure was to run parallel to the powerlines if possible. However, smaller, more difficult or irregular-shaped areas might require crossing powerlines. The completion of each spray run generally required the pilot to conduct a 180° turn prior to commencing the next run.

In order to achieve consistent chemical application rates and to ensure an even spray coverage, aerial application pilots fly at set target speeds and altitudes. The spray nozzle technology employed by the operator enabled application of the chemical from higher altitudes. On the day of the accident, the target speed was about 45 kts, and the target altitude was 100 to 150 ft AGL, terrain permitting.

AG-NAV system

The AG-NAV® Guía[21] is a DGPS navigation system that was designed to provide pilots with guidance in aerial applications. The system consisted of a moving map display with a six-key keypad, a stand-alone DGPS receiver and a light bar.

A system function enabled a pilot to mark an obstacle or hazard for display on the AG-NAV screen. It could then provide a visual warning to the pilot on the screen based on a time-to-obstacle that was set by the pilot.

The data that was recovered from the AG-NAV system showed no recorded obstacles or location recordings that corresponded to the position of the powerline.

Distraction

Distraction refers to drawing away or diverting attention, or to an action that divides attention. Broadly, distraction becomes a risk when multiple stimuli or tasks make simultaneous demands for attention. Generally, distraction results from one of these competing stimuli or tasks interfering with or diverting attention from an individual's original task or focus.

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21 See http://www.agnav.com for more information.

The ATSB research report titled *Dangerous distraction: An examination of accidents and incidents involving pilot distraction in Australia between 1997 and 2004*[22] found that the primary sources of pilot distraction were associated with equipment malfunctions, problems communicating on the radio, passengers, and weather.

Australian data indicated that agricultural application occurrences comprised 5.5% of the distraction-related occurrences and that 17 of 18 of the distraction-related agricultural application occurrences occurred during the manoeuvring phase of flight.

About 6% of all distraction occurrences resulted in a collision with a powerline. Three per cent of distraction-related occurrences involving a wirestrike were associated with equipment malfunctions.

Visual cues

The ability of pilots to detect powerlines depends on the physical aspects of the conductor (wire), such as the spacing of power poles, the orientation of the wire, and the effect of weather (especially visibility).

Depending on the environmental conditions, powerlines may not be contrasted against the surrounding environment. Often the wires will blend into the background vegetation and cannot be recognised. In addition, the wire itself can be beyond the resolving power of the eye: that is, the size of the wire and limitations of the eye can mean that it is actually impossible to see the wire. As such, pilots are taught to use additional cues to identify powerlines, such as the associated clearings or easements in trees or fields, or the power poles and/or buildings to which the powerlines connect.

The ability of a human to identify a power pole located in the periphery of the retina is also limited because the eye’s peripheral capability is designed to detect movement rather than the detail of an object.

During agricultural operations, pilots must retain the position of a powerline in their memory, and may rely on other visual indications of the presence of a wire (such as a group of trees near a power pole or similar). If a pilot then approaches the area from a different direction, the cues they relied on previously may no longer be noticeable or relevant to the re-identification of the hazard.

22 Available for download at http://www.atsb.gov.au/media/36244/distraction_report.pdf.

Pilot attention

The amount of time spent on a task can affect the ability of a person to remain attentive and vigilant, and the speed and accuracy of detection of stimuli decreases significantly over the first 20 to 35 minutes after commencing a task. It is possible to maintain a person's attention by:[23]

> ...making visual cues more obvious, providing better work-rest schedules, altering a task being performed, and to maintain noise and temperature at optimal levels.

The ATSB research report titled *Wire-strike accidents in general aviation: Data analysis 1994 to 2004*[24] found that 63% of pilots were aware of the wire before it was struck. With reference to wirestrike accidents involving aerial agriculture aircraft only, the data indicated that 71% of pilots were aware of the wire before it was struck.

Perception and reaction time

The following perception and reaction times are indicative of the times taken to recognise and react to a hazard in flight:[25]

> **Perception Time**. It takes a finite amount of time for an object to be detected, recognised, a decision made on an action, and then for that reaction to be initiated. Table 7-1 lists the expected times for these events to happen. It can take up to 5.5 seconds for the process to be completed.

Process	Time (Seconds)
Detect, visualise, recognise	1.0
Decide what to do	2.0
Initiate action	2.5
Total	**5.5**

Table 7-1. Perception and Reaction Time

In 1983, the United States (US) Federal Aviation Administration produced an advisory circular[26] that included the results of a study that was undertaken by the US Navy to determine the time taken for pilots to recognise and react to a collision hazard posed by an approaching aircraft.[27] The results of the US Navy study indicated that up to 12.5 seconds can be taken to recognise and react to a collision hazard.

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23 Saunders, M. S. & McCormick, E. J. (1993). *Human factors in engineering and design (Seventh edition).* NY: McGraw-Hill.

24 Available for download at http://www.atsb.gov.au/32640/wirestrikes_20050055.pdf

25 Szczecinski, G., & Cable, G. (undated). *Aviation medicine for aircrew*. Edinburgh, SA: Royal Australian Air Force Institute of Aviation Medicine.

26 Federal Aviation Administration. (1983). *Pilot's role in collision avoidance* (Advisory Circular 90-48C). Washington, DC: Author.

27 The results were based on an assessment of two Lockheed T-33 Shooting Star aircraft approaching directly towards each other.

The range of perception-reaction times obtained by those studies was consistent with other literature on hazard avoidance.[28]

Establishment of a single source or database of known powerlines, and tall structures

A number of previous ATSB investigations have considered the potential safety benefits of the establishment of a single source or database of known powerlines, and tall structures. In particular, the investigation into the wirestrike that occurred 15 km east of Parkes Airport, New South Wales on 2 February 2006 and involved Bell Helicopter Co 206B (III) identified the following safety issue:[29]

> There was no single source or database of information on the location of known powerlines and tall structures available to pilots, operators and managers of aerial campaigns for use during the planning of those campaigns.

Following initial advice from aviation authorities at the time of a number of likely problems with establishing such a database, the ATSB commenced discussions with Geoscience Australia and the Energy Networks Association to examine alternate options for its establishment. Sometime later, the then Department of Infrastructure, Transport, Regional Development and Local Government, subsequently restructured and renamed as the Department of Infrastructure and Transport (DoIT), assumed responsibility for the potential development of the database.

As part of this investigation, an update was requested from DoIT on the status of the database. DoIT provided the following advice in respect of the development of an Australia-wide electronic terrain and obstacle database (eTOD):

- Previous Coroners reports into wirestrikes in NSW and Victoria have made recommendations that the Civil Aviation Safety Authority (CASA) should establish a database of obstacles, such as powerlines
- International Civil Aviation Organization (ICAO) Annex 15 and Annex 4 provide standards and recommended practices for the collection, storage and dissemination of terrain and obstacle data. As a Member State of ICAO, Australia is examining the practical aspects of meeting ICAO's requirements, noting that many countries around the world have so far not indicated they can meet all the ICAO requirements
- A working group consisting of representatives of the Department of Infrastructure, CASA, Airservices Australia and the Department of Defence has been cooperating with Geoscience Australia to examine ways of establishing an electronic terrain and obstacle database, know as an eTOD. The work of the group is ongoing.

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[28] Leibowitz, H. W. (1988). The human senses in flight. In E.L. Wiener & D.C. Nagel *Human factors in aviation* (pp. 83-110). San Diego: Academic Press.

[29] Available for download at http://www.atsb.gov.au/publications/investigation_reports/2006/aair/ao-2006-155.aspx

ANALYSIS

The aerial application of chemical and other substances, like any other low-level operation, elevates the risk of a wirestrike. Extensive investment has been, and continues to be made by regulatory and other authorities, industry participants and safety agencies in an effort to minimise that risk.

There was no evidence to suggest that the performance of the helicopter or its systems might have contributed to this wirestrike. This analysis will examine the contributory and other operational factors in the development of the accident.

Wirestrike

The pilot's application of chemical to the remaining area of the coupe resulted in the helicopter's flightpath crossing the powerline. Although the pilot was aware of the location of the wire, having been briefed about it and having flown over it previously, it appears that he failed to recall the wire during the final stages of spraying the coupe. In addition, the pilot was not alerted to the presence of the wire via high visibility or other devices and therefore avoidance of the wire relied on prior briefing, pilot recall and visual detection.

Based on the recorded Global Positioning System (GPS) groundspeed and the distance at which, under ideal conditions, the wire would be visually detectable, the pilot would have had less than 2 seconds to detect and react to the wire. The low contrast offered by the background trees, together with other possible visual limitations such as not observing the wire using central vision, perhaps due to not looking at the wire at the time, would have increased the difficulty of seeing the wire and reduced the available time to take avoiding action.

The time required to detect and avoid a midair collision hazard between two aircraft could be expected to differ from the time required to detect and avoid a wire. However, the indicative time frame of 5.5 to 12.5 seconds is significantly longer than the time that was available to the pilot in this occurrence. This is consistent with the pilot probably not detecting or not having sufficient time to avoid the wire, and indicates that the avoidance of wires using the see-and-avoid method is not particularly effective for operations in the low-level environment.

Pilot risk management

The practice within the aerial agricultural industry to extensively pre-plan an application task is a valid risk management approach that takes into consideration the hazards affecting an application. The pilot, assisted by the plantation owner's forestry site controller, had adhered to the operator's requirements for the pre-flight planning, briefings and survey necessary before commencing aerial agricultural operations. That process was appropriate given the typical 30-year period between aerial activity for the area. The evidence indicated that the pilot was aware of the powerline that was struck.

Availability of visual cues to assist with the detection of a wire hazard

During low-level operations, it can be difficult for pilots to see a powerline that can often be ‘lost’ in the visual background environment. In that case, the importance of visual cues to assist in the location of powerlines and other hazards, such as buildings, power poles, and easements should not be underestimated.

The long span, undulating terrain, partially overgrown cutting, obscuration of the power poles and high trees on the pilot’s right and left during the final leg of the spray run would have made it difficult for him to visually identify either power pole. As a result, there was increased reliance on the pilot being able to detect the wire itself. Furthermore, the ability of the pilot to detect the wire was diminished as a result of the predominantly grey wire blending in with the dark-coloured surrounding trees in overcast conditions.

The lack of a recording of the location of the wire on the helicopter’s AG-NAV differential GPS system and powering off of the system about 30 seconds prior to the wirestrike meant that the pilot would not have received a hazard alert as he approached the powerline. In general, the consideration of the use of a similar function in aerial application systems might assist in alerting pilots to the presence of hazards.

Similarly, the extent to which the use of powerline markings, consistent with those envisaged in Part 2 of the Australian Standard, would have improved the pilot’s ability to detect the wire could not be quantified. However, their use would have likely increased the pilot’s ability to detect and avoid it.

Distractions during low-level operations

Divided attention can be a routine part of flying, especially during low-level operations such as agricultural spraying. Any stimulus in that environment that captures a pilot’s focus for longer than normal, such as thinking of the next spray job or a technical problem increases the risk of low-level hazards, such as powerlines, not being identified by the pilot.

It was possible that the pilot may have been distracted by the AG-NAV GPS unit powering off while setting up to spray the final coupe area. As a distraction, it had the potential to affect the pilot’s awareness and/or recall of the powerline that was struck.

Additional comments

The investigation did not identify any organisational or systemic issues that might adversely affect the future safety of aviation operations. However, the accident does act as a timely reminder of the need for operators and pilots to consider using temporary visual markers and/or obstacle alert functions in aerial application systems as part of their hazard mitigation process before each operation.

FINDINGS

From the evidence available, the following findings are made with respect to the wirestrike that occurred 37 km south-south-west of Latrobe Valley Airport, Victoria on 20 May 2010 involving Bell Helicopter Company B206L-3, registered VH-OSU and should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing safety factors

- The pilot conducted a spray run that resulted in the helicopter contacting the powerline in the vicinity of the mast, which seriously damaged the helicopter's flight control system and likely rendered the helicopter uncontrollable.
- The pilot probably failed to recall the wire that crossed the intended flightpath.
- The dull surface of the powerline, the nature of the vegetation and topographical background, the obscuration of the supporting poles and long span of the powerline made them extremely difficult to see.
- The operating speed for chemical application meant that the pilot probably did not see the powerline in sufficient time to avoid the wirestrike.

Other safety factors

- The powerlines were not marked, nor were they required by the relevant Australian Standard to be marked with high visibility devices.
- The pilot did not use the aircraft's AG-NAV differential Global Positioning System equipment to record or mark the wire as a hazard.

Other key findings

- The AG-NAV differential Global Positioning System spray guidance unit powered off about 30 seconds before the wirestrike for unknown reasons.
- Examination of the helicopter indicated that the non-completion of a number of overdue routine maintenance items did not contribute to the development of the accident.

SAFETY ACTION

The safety issues identified during this investigation are listed in the Findings and Safety Actions sections of this report. The Australian Transport Safety Bureau (ATSB) expects that all safety issues identified by the investigation should be addressed by the relevant organisation(s). In addressing those issues, the ATSB prefers to encourage relevant organisation(s) to proactively initiate safety action, rather than to issue formal safety recommendations or safety advisory notices.

All of the responsible organisations for the safety issues identified during this investigation were given a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

Proactive safety action

The investigation did not identify any organisational or systemic issues that might adversely affect the future safety of aviation operations. However, following this occurrence, proactive safety action has been taken by the following organisations.

Energy Safe Victoria[30]

As a result of this accident, Energy Safe Victoria (ESV) issued an electrical safety alert to electricity providers and the Aerial Agricultural Association of Australia (AAAA) (Appendix A). In summary, that safety alert advised:

> ESV stresses that safety must never be compromised and when performing aerial agricultural spraying, pilots must:
>
> 1. ensure they have a valid aerial agricultural rating and current medical certificate;
> 2. ensure that the aircraft has a current approval from the Civil Aviation Safety Authority for agricultural operations;
> 3. not allow or cause any part of the aircraft to come closer than 45 metres to any power line, substation or power station;
> 4. prior to carrying out any aerial agricultural operation, take reasonable care to:
>
>   a. locate all aerial lines in the operational area; and
>
>   b. perform and document a job safety assessment identifying all overhead lines in the operational area to avoid risk to persons and damage to property.
> 5. report to the relevant electricity company all details of any incident involving the aircraft under his or her control with overhead power lines.

30 Energy Safe Victoria is the state safety regulator responsible for electrical and gas safety in Victoria.

> Care and attention before taking off will help pilots keep clear of power lines. It is prudent to consult with electricity companies with a view to marking of power lines in areas of known frequent low level flying activities.

Australian Transport Safety Bureau

Consideration of the use of temporary markings

The advice provided by ESV to electricity providers and the AAAA that it is prudent to consult with electricity companies with a view to the marking powerlines in areas of known frequent low-level flying activities is consistent with Australian Standard AS 3891.2, 2008, Part 2: *Marking of overhead cables for planned low level flying operations*.[31] It could be anticipated that the ESV advice will have effect with electricity providers in Victoria, and with members of the AAAA.

The ATSB remains concerned that there is currently no assurance that electricity providers in the other states and territories, or that agricultural operators who may not be members of the AAAA or other low-level operators in general, are aware of the standards for marking powerlines in areas of known frequent low-level flying activities. That awareness includes that persons requesting low-level flying operations should be involved in the consideration of the installation of markers in such cases.

The ATSB issues the following Safety Advisory Notice to the Energy Networks Association (ENA) of Australia in anticipation that ENA will advise its content to all ENA members, and also to operators and pilots involved in low-level operations.

Safety Advisory Notice AO-2010-033-NSA-022

As a result of safety action by Energy Safe Victoria after this wirestrike, it can be anticipated that providers of electricity in Victoria, and members of the Aerial Agricultural Association of Australia will have an enhanced understanding of Australian Standard (AS) 3891.2, 2008, Part 2: *Marking of overhead cables for planned low level flying operations* in respect of marking powerlines in areas of known frequent low-level flying activities. Other state and territory electricity providers and regular low-level operators and pilots would also benefit from that awareness. That includes the need to involve persons requesting a low-level operation in the consideration of marking powerlines before commencing a low-level operation.

The ATSB suggests that members of the Energy Networks Association (ENA) of Australia, and operators and pilots that are involved in low-level operations should, in consultation with those requesting the low-level operation, and taking account of the likely regularity of such operations in an area, consider the need for any powerlines to be marked in accordance with AS 3891.2, 2008, Part 2: *Marking of overhead cables for planned low level flying operations*.

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31 Standards Australia. (2008). *Air navigation – Cables and their supporting structures – marking and safety requirements, Part 2: Marking of overhead cables for planned low level flying*. (2nd Ed.) (Australian Standard AS 3891.2). Sydney, NSW: Author.

In that regard, AS 3891.2 states that temporary or permanent wire markers should be installed where regular low-level flying operations take place, and that the following risk assessment criteria should be considered:

> The person requesting the installation should also consider the following risk management issues when assessing whether a marker is to be installed:
>
> (a) Is the cable located in an area where aerial application activities are likely to take place. In particular, are crops to be grown under or near the cable?
>
> (b) Is the cable, or part thereof, in a position that would make identification by a pilot difficult, such as near trees, cutting the corner of a paddock, or coming off another cable at an angle that will be difficult or confusing to the pilot to identify during low level flying operations?
>
> (c) Is the cable strung at a high level (i.e. higher than ambient vegetation height) across a valley where a pilot, for example conducting a firebombing operation, would find it difficult to identify?
>
> (d) If a cable being repaired has ever been struck by an aircraft, then it should be marked, preferably at the time of repair.
>
> (e) Have the property owner, the cable owner and the aerial agricultural operator been consulted?

The ATSB requests that ENA advise its members of the content of this Safety Advisory Notice.

Managing the risk of wirestrike during aerial application

In addition to this accident, the ATSB has recently investigated a number of wirestrike accidents where an aerial agriculture aircraft collided with a wire that the pilot had known about, and been operating in the vicinity of prior to the wirestrike. Common to those accidents was the change of plans for the spraying operation immediately prior to the wirestrike.

As a result, the ATSB has published educational report AR-2011-028 titled *Managing the low level hazard of wirestrike during aerial agriculture operations*, which is aimed at aerial agriculture pilots and people organising aerial spraying activities. The report provides strategies to help pilots ensure that wires are identified and avoided, and continue to be avoided throughout their operations, including when there is a departure from the planned operation.

Education report AR-2011-028 is available via the ATSB web site at www.atsb.gov.au .

Establishing the wirestrike risk in Australia

During the conduct of this investigation, a number of wirestrikes were reported by a power supply company that, contrary to the reporting requirements of the *Transport Safety Investigation Act 2003*, had not been reported to the ATSB by the pilot or operator of the aircraft sustaining the wirestrike. In addition, there was anecdotal evidence from an aviation association that some of its members may not have reported a number of wirestrikes by members’ aircraft.

The non-reporting of wirestrike or other reportable occurrences reduces the reliability of the occurrence data held by the ATSB. The unintentional application of incomplete wirestrike data by safety practitioners can adversely affect the understanding of the magnitude of the wirestrike risk in Australia, and therefore the development of appropriate strategies to mitigate that risk.

In an effort to more fully understand the magnitude of the under reporting of wirestrikes in Australia, and the possible implications for the safety of low-level operations, the ATSB has commenced research investigation AR-2011-004 titled *Unreported wirestrikes*. That investigation will source wirestrike data from power supply companies throughout Australia, and work with a number of aviation associations, groups and agencies in order to obtain a more informed understanding of the risk of a wirestrike during low-level operations.

The results of the research investigation will allow for a more reliable wirestrike data set, and potentially influence the development of an Australia-wide electronic terrain and obstacle database, and other initiatives in response to the wirestrike risk.

When complete, investigation report AR-2011-004 will be made available via the ATSB web site at www.atsb.gov.au

APPENDIX A: ENERGY SAFE VICTORIA SAFETY ALERT

ELECTRICAL SAFETY ALERT

energysafe VICTORIA

Watch Out for WIRES

A spate of serious incidents in Victoria involving crop dusting aircraft and overhead power lines - and a likely significant increase in locust control activities in the coming months - has prompted Energy Safe Victoria (ESV) to issue the following warning.

In recent months ESV has received four reports of spraying aircraft colliding with overhead power lines in Victoria.

ESV recognises that agricultural pilots operate in a special environment which involves low level flying, but reminds pilots and operators that overhead power lines can be very difficult to see during low level flying operations, depending upon altitude, angle, visibility, background terrain, vegetation or the sky. Therefore, unnecessary low level flying in the vicinity of overhead power lines must be avoided.

The projected locust plague this spring is expected to increase aerial spraying activity, and pilots of low flying aircraft must be constantly on watch for wires and must conduct a diligent site risk assessment before taking off.

A particular hazard when flying low in the presence of plague locusts is the possible rapid loss of forward visibility due to the impact of large numbers of insects on the windscreen of the aircraft.

ESV stresses that safety must never be compromised and when performing aerial agricultural spraying, pilots must:

1. ensure they have a valid aerial agricultural rating and current medical certificate;
2. ensure that the aircraft has a current approval from the Civil Aviation Safety Authority for agricultural operations;
3. not allow or cause any part of the aircraft to come closer than 45 metres to any power line, substation or power station;
4. prior to carrying out any aerial agricultural operation, take reasonable care to:
    a. locate all aerial lines in the operational area; and
    b. perform and document a job safety assessment identifying all overhead lines in the operational area to avoid risk to persons and damage to property.
5. report to the relevant electricity company all details of any incident involving the aircraft under his or her control with overhead power lines.

Care and attention before taking off will help pilots keep clear of power lines. It is prudent to consult with electricity companies with a view to marking of power lines in areas of known frequent low level flying activities.

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APPENDIX B: SOURCES AND SUBMISSIONS

Sources of information

The sources of information during the investigation included:

- the owners/operator of VH-OSU (OSU)
- the ground support crew
- maintenance providers for OSU
- the electricity provider
- forestry plantation owner
- the AG-NAV GPS manufacturer
- the Civil Aviation Safety Authority (CASA)
- the Bureau of Meteorology (BoM)
- the Department of Infrastructure and Transport (DoIT)
- Energy Safe Victoria.

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Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003,* the Australian Transport Safety Bureau (ATSB) may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the helicopter owner/operator, the ground support crew, the electricity provider, the forestry plantation owner, and CASA.

Submissions were received from the forestry plantation owner and a witness. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.

Wirestrike – 37 km SSW of Latrobe Valley Airport, VIC., 20 May 2010
VH-OSU, Bell Helicopter 206L LongRanger III