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Australian Transport Safety Bureau

Loss of separation involving a Boeing 717, VH-NXL, and a vehicle

Perth Airport, Western Australia on 26 July 2014

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Addendum

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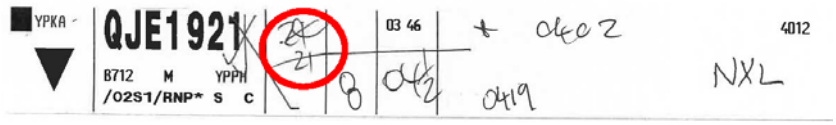
Loss of separation involving a Boeing 717, VH-NXL, and a vehicle

What happened

On 26 July 2014, the crew of a QantasLink Boeing 717 aircraft, registered VH-NXL (NXL), conducted a scheduled passenger flight from Karratha to Perth, Western Australia. At about 1158 Western Standard Time, the approach air traffic controller at Perth Airport cleared NXL to conduct an instrument landing system (ILS) approach to runway 24. The automatic terminal information service (ATIS) current at that time had been issued about 14 minutes earlier, and indicated that the runway was wet with visibility reducing to 3 km in showers of rain and a cloud base of 800 feet. Runways 21 and 24 were the runways in use.

At about 1159, having had a 30 minute break, the aerodrome controller (ADC) took over the position from another controller. At about 1200, the first officer of NXL, as pilot monitoring (PM),[1] switched frequencies from approach to tower, and contacted the ADC who acknowledged the call. The ADC amended the paper flight progress strip which had runway 21 written on it (Figure 1) as they could see on the air situation display (ASD) that the aircraft was on final for runway 24 and the label on the ASD indicated 24.[2] About 45 seconds later, the ADC cleared an Airbus A330 aircraft to land on runway 21.

Figure 1: Flight progress strip for VH-NXL



Source: Airservices Australia

Also at about 1200, an airport safety officer (SO) drove out to the holding point for runway 24 on taxiway Whiskey (W) to conduct a routine runway inspection. The safety officer's vehicle, call-sign 'Safety Two' was bright yellow and fitted with a rotating orange beacon which was switched on. Approaching the holding point, in accordance with standard operating procedures, the SO contacted the surface movement controller (SMC) advising that the vehicle was at W, holding short of runway 24 for a runway inspection. The SMC directed the SO to hold short of runway 24 and contact the tower. At about 1201, the SO contacted the ADC in the tower and advised that they were holding short of runway 24 for a runway inspection. The ADC cleared the SO to enter runway 24 and hold short of runway 21, then wrote 'S2' on the console runway strip to indicate that runway 24 was occupied.

At that time, NXL was on final approach for runway 24 about 7.5 NM from the runway. Neither of the flight crew of NXL recalled hearing the vehicle being cleared onto the runway. On commencing the runway inspection, the SO checked the operation of the precision approach path indicator (PAPI)[3] on runway 24 due to an earlier heavy rain squall. The SO then continued driving along the centreline of runway 24 towards the intersection with runway 21. About 17 seconds later, the crew

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1 Pilot Flying (PF) and Pilot Monitoring (PM) are procedurally assigned roles with specifically assigned duties at specific stages of a flight. The PF does most of the flying, except in defined circumstances; such as planning for descent, approach and landing. The PM carries out support duties and monitors the PF's actions and aircraft flightpath.

2 When the approach controller amended the runway for an arriving aircraft, they would update the runway in The Australian Advanced Air Traffic System (TAAATS) which would then be reflected on the label on the ASD but not on the flight strip.

3 Precision Approach Path Indicator (PAPI) is a ground based, visual approach indicating system that uses a colour discriminating system used by pilots to identify the correct glidepath to the runway.

of the Airbus A330 on final approach to runway 21 requested the PAPI to be set to maximum intensity which the ADC then selected. The A330 then landed on runway 21.

At about 1203, the ADC cleared a Fokker 100 (F100) aircraft for take-off from runway 21. After observing that aircraft pass through the intersection of runway 24, the ADC picked up the flight progress strip for NXL, scanned the runway but did not see the vehicle on it. The ADC then moved the strip into the console runway bay (Figure 2) without noticing the safety vehicle strip, while simultaneously observing the F100 become airborne.

Figure 2: Perth aerodrome controller console

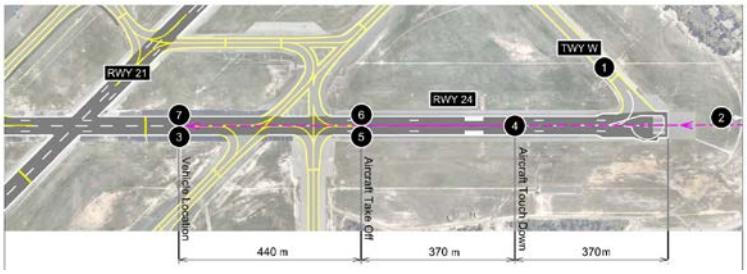
Source: Airservices Australia

The ADC then provided the crew of NXL with the current wind speed and direction at the runway threshold and cleared NXL to land on runway 24. At that time, NXL was on final approach at about 1,000 feet and 1.5 NM from the runway threshold. The safety vehicle was on runway 24 heading south-west just passing taxiway Charlie. The SO reported that while operating on runway 24, they heard NXL being cleared to land but did not hear the assigned runway; otherwise they would have vacated the runway immediately. They expected the aircraft would land on runway 21. When cleared to land, NXL was still in cloud and the first officer sighted the runway when at about 700 feet above the ground.

At about 1204, as NXL touched down on runway 24 about 370 m from the threshold, the first officer saw the flashing lights of a vehicle ahead on the runway, immediately stated ‘go-around, car on the runway’ and the captain commenced a go-around. About 6 seconds later, the aircraft became airborne about 740 m from the threshold. At that time, the safety vehicle was stationary on the centreline of runway 24 about 1180 m from the threshold and facing away from the approaching aircraft. The SO did not see the aircraft, until it passed about 150 feet over the vehicle (Figure 3).

Figure 3: Sequence of events

Point	Description
1	Safety vehicle held at W
2	NXL cleared to land on runway 24
3	Safety vehicle stopped short of runway 21
4	NXL touched down on runway 24
5	NXL reported going around due car on the runway
6	NXL became airborne
7	NXL passed over vehicle at a height of 150 ft



Source: Perth Airport Pty Ltd

At about the same time, the ADC directed the F100 to contact Departures then recorded the landing time on the flight strip for NXL, before hearing the first officer of NXL broadcast 'going around, car on the runway'. At about 1205, the SO asked 'what happened there?' on the tower frequency and the ADC directed the SO to vacate the runway. The ADC then coordinated NXL's missed approach with the Departures controller and instructed the flight crew to transfer frequencies. At about 1206, the SO reported having vacated runway 24 to the ADC. About 20 seconds later, the ADC handed over the Tower position to a relieving controller.

Runway inspections

Five routine runway inspections were conducted daily at Perth Airport: serviceability inspections at 0000 and 0800; and Foreign Object Damage (FOD) inspections at 0500, 1200, and prior to last light. Additional ad-hoc inspections were carried out as required due to weather, birdstrikes or other extenuating circumstances.

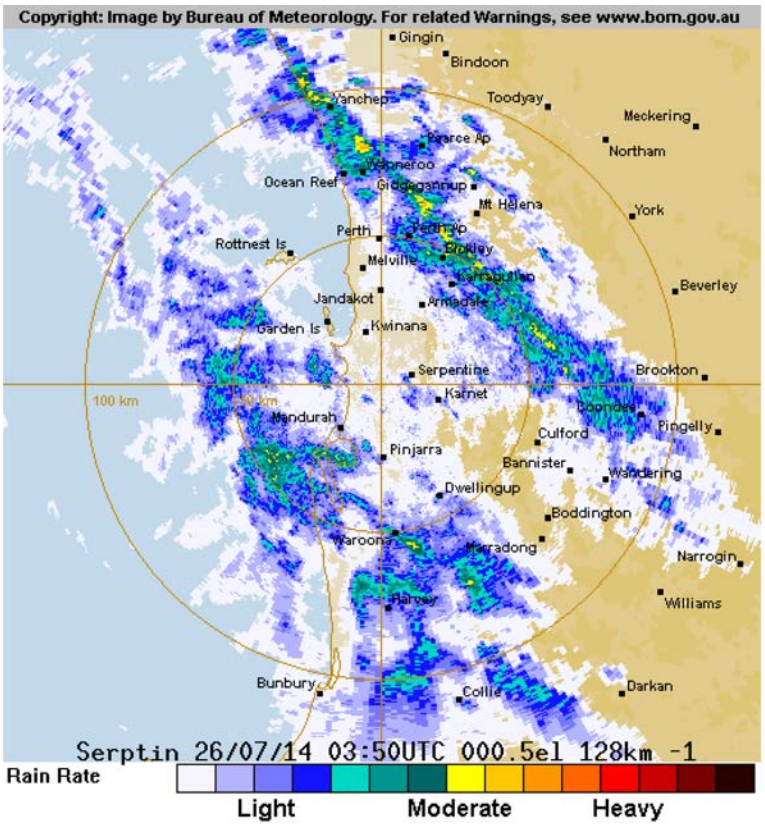
Until May 2014, the standard work procedure was for vehicles to be driven towards oncoming aircraft during the FOD inspections. For the serviceability inspections, the common practice was to follow a set route designed to minimise radio traffic and runway crossings. This resulted in the SO driving towards oncoming aircraft on one runway and with the flow of the aircraft on the other runway. Following a request on 7 May 2014 from Airservices Australia to expedite runway inspections by operating with the flow of aircraft traffic, an email was sent to the SOs by the Perth Airport Pty Ltd Airside Operations Managers regarding conduct of inspections with the flow of aircraft where possible to increase efficiency. Since then, most FOD inspections were conducted with the flow of the aircraft traffic.

At the time of the incident, the safety vehicle was facing away from the landing aircraft, and stationary on the white runway 24 centreline markings. The first officer in NXL reported that it was very difficult to see the vehicle on the runway markings. He started looking when the aircraft was about 30 ft AGL and only saw the vehicle as the main landing gear touched down.

Weather information

The Bureau of Meteorology data indicated that about 10.2 mm of rain fell between 1150 and 1200 on the day of the occurrence. The weather radar showed a line of showers passed through the area about 10 minutes prior to the incident (Figure 4).

Figure 4: Rain radar at 1150 WST



Source: Bureau of Meteorology

Controller comments

The aerodrome controller (ADC) provided the following comments:

- A heavy shower had moved through from west to east and was about 3 NM on final approach to runway 24. A moderate shower was passing over the airport at the time of the incident.
- After many years of experience in air traffic control at Perth Airport, the controller had become efficient at the controlling duties, in particular by combining tasks together, or ‘chunking’. In this incident, the controller combined the tasks of picking up the aircraft’s flight progress strip in their left hand, while sighting the aircraft and checking that the landing gear was down, scanning the runway, issuing the landing clearance, and placing the strip into the console runway bay, without separating out the individual tasks. The controller reported that they now segment the tasks and complete them serially as separate actions, rather than simultaneously.
- The controller had a single runway bay on the Tower console (Figure 2) where flight progress strips for aircraft using either of the two runways in use were placed. The runway assigned to the aircraft was written on the aircraft’s strip.
- The vehicle strip (red with a white centre) was in the console runway bay at the time of the incident. There were two possible reasons the controller may have missed it: the process of placing the aircraft strip without reconciling with the vehicle strip already there was a muscle memory or automatic process rather than a conscious one; or, the combination of picking up the strip, talking and scanning all at once when issuing a landing clearance meant that the controller was looking outside at the runway, talking and moving the strip without looking at the bay to reconcile the strips.
- Recently vehicles were operating more often in the same direction rather than in a reciprocal direction to aircraft movements. Prior to that, the safety vehicles would always conduct runway inspections in a reciprocal direction.

Flight crew comments

The captain of NXL provided the following comments:

- It was a split second decision to go around. If they had commenced the reverse thrust action, they would have been committed to landing.
- The aircraft had landing lights, navigation lights, beacon and high intensity lighting on at the time of the incident.
- The first officer was highly experienced which may have assisted in sighting the vehicle and reacting quickly. The incident provided a very good example of the value of flight crew knowing their role as pilot flying or pilot monitoring explicitly and maintaining a good awareness of their environment.

Safety officer comments

The safety officer reported that at about 1200, there was communication on the 'chit chat' radio on company frequency regarding a malfunctioning security gate which may have diverted their attention and contributed to his not hearing the aircraft being cleared to land on runway 24. The safety officer vacated the runway immediately on receiving the instruction from the controller.

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Upgrade to Airservices Australia technologies

Two Airservices Australia technological advancements are scheduled to be commissioned at Perth Airport in the next 12 months which will add significant layers of protection against such an incident. Advanced surface movement guidance control system (ASMGCS) or ground radar, will track and provide a visual display of all aircraft and vehicles on the airfield to air traffic control (ATC) personnel. In this incident, ATC would have received an alert indicating the conflict between the aircraft on final and the vehicle on the runway.

An integrated tower automation suite (INTAS) will combine flight and operational data, surveillance and voice communications into a single integrated tower-specific layout and replace the existing manual air traffic control system. If INTAS had been available at the time of this incident, the controller would have been able to allocate the electronic flight strip assigned to the aircraft in the runway bay, but an alarm would have been triggered.

Airport operator

As a result of this occurrence, Perth Airport Pty Ltd management has proposed the following recommendations:

- Human factors training for Safety Officers is to include a specific focus on relationships with ATC and situational awareness.
- Review the need for a dedicated radio channel for Safety Officers to use when operating on or crossing runways. The company frequency (chit chat) radio is to be switched off during runway operations.
- Reassess the suitability of vehicle lighting for runway operations.
- Mandate all runway inspections to be performed facing oncoming traffic.
- Review the types, frequency, methods and timing of runway inspections.
- Investigate technology that minimises runway entry and occupancy requirements.
- Review runway inspection techniques used at other airports.

Safety message

With experience comes the ability to fuse conscious control with largely automated actions. Instead of conscious focus on individual tasks, experts develop the ability to join separate movements and words together into packages or sequences. This automation of mental performance can improve efficiency and free up attentional resources for other tasks. However, the penalty for mental automation can be absent-mindedness or a lack of attention to a specific task.[4]

General details

Occurrence details

Date and time:	26 July 2014 – 1204 WST	
Occurrence category:	Serious Incident	
Primary occurrence type:	Runway incursion	
Location:	Perth Airport, Western Australia	
	Latitude: 31° 56.42' S	Longitude: 115° 58.02' E

Aircraft details

Manufacturer and model:	The Boeing Company 717-200	
Registration:	VH-NXL	
Operator:	National Jet Systems	
Serial number:	55093	
Type of operation:	Air Transport High Capacity – Passenger	
Persons on board:	Crew – 5	Passengers – 105
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

About the ATSB

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB 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; and 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.

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.

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[4] Reason, J, 2008. *The human contribution: unsafe acts, accidents and heroic recoveries*. Ashgate, England.

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.

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.