



Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY REPORT

Aviation Occurrence Investigation AO-2007-031

Final

**Fumes event
enroute Sydney to Albury
5 August 2007
VH-RXX
Saab Aircraft AB 340B**



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Abstract

On 5 August 2007 at 1407 Eastern Standard Time, a Saab Aircraft AB 340B, registered VH-RXX, was being operated on a scheduled passenger service from Sydney to Albury, NSW. It was the aircraft's first flight of the day and the first flight after a routine compressor wash carried out on the engines.

An odour, which had been apparent inside the aircraft during the preflight procedure and taxi, and which was described as 'similar to curry', became much stronger from just before rotation until about two minutes after takeoff. Believing the fumes were caused by compressor wash fluid and would dissipate, the flight crew elected to continue the flight.

The manufacturer of the compressor wash fluid confirmed that, when heated, it would produce an odour similar to curry.

The operator reported that their compressor wash procedure had been followed, and was unable to explain the subsequent ingress of fumes to the cockpit and cabin of the aircraft.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an operationally independent multi-modal bureau within the Australian Government Department of Infrastructure, Transport, Regional Development and Local Government. ATSB investigations are independent of regulatory, operator or other external bodies.

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 enhance safety. To reduce safety-related risk, ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not the object of an investigation to determine blame or liability. However, 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 proactively initiate safety action rather than release formal recommendations. However, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation, a recommendation may be issued either during or at the end of an investigation.

The ATSB has decided that when safety recommendations are issued, they will focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on the method of corrective action. As with equivalent overseas organisations, the ATSB has no power to implement its recommendations. It is a matter for the body to which an ATSB recommendation is directed (for example the relevant regulator in consultation with industry) to assess the costs and benefits of any particular means of addressing a safety issue.

About ATSB investigation reports: How investigation reports are organised and definitions of terms used in ATSB reports, such as safety factor, contributing safety factor and safety issue, are provided on the ATSB web site www.atsb.gov.au.

FACTUAL INFORMATION

History of the flight

On 5 August 2007 at 1415 Eastern Standard Time¹, a Saab Aircraft AB 340B (Saab 340B), registered VH-RXX, with a crew of three and 20 passengers, was being operated on a scheduled passenger service from Sydney to Albury, NSW. It was the aircraft's first flight of the day.

The pilots reported noticing an odour when they first entered the aircraft, describing it as 'similar to curry'. The odour remained in the cockpit after engine start and the pilots thought it might have been as a result of residual engine compressor wash fluid.

The takeoff proceeded normally, however the odour increased in intensity and became very strong and pungent from just before rotation until about two minutes after takeoff. The crew reported that all engine and propeller indications were normal. The flight attendant reported that the fumes appeared in the cabin about 30 to 45 seconds after takeoff.

The Saab 340B has no specific checklist to be actioned in response to fumes in the cockpit. The flight crew reported that they engaged the autopilot as quickly as possible and donned their oxygen masks after performing the after-takeoff checks. At approximately 60 km from Sydney, the intensity of the fumes had diminished considerably, but they were still present and the flight crew elected to remain on oxygen as a precaution. The flight attendant confirmed to the pilots that the intensity of the fumes in the cabin had also diminished.

At about overhead Canberra, the flight crew decided to divert to Wagga Wagga, NSW, where the operator had engineering support and where it would be possible to replenish the oxygen system. They remained on oxygen until they landed at Wagga Wagga.

On the next sector from Wagga Wagga to Albury, icing conditions were encountered during the descent. As part of their normal procedure in icing conditions, the flight crew turned on the high pressure engine bleed valves and the odour again intensified, although it was not as strong as during the takeoff from Sydney.

The aircraft was inspected by company engineers after its return to Sydney and they reported that there was a strong odour of compressor wash fluid in the right engine air inlet.

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.

Engine compressor washing

The operator scheduled engine compressor washes (required by the engine manufacturer to remove dirt and other contaminants) on its Saab 340B aircraft every 200 hours of engine operation. A cleaning solution was introduced into the engine, left to soak to remove contaminants, and flushed out with a hot water rinsing solution followed by a second hot water rinse. The engine would then be run at high power (80 percent) during a 'drying run'.

At Sydney, during night curfew noise restrictions, it was not possible to conduct high-power engine runs and the operator's procedure during night curfew was to conduct extended drying runs at ground idle. The operator reported that regular use of this procedure had not resulted in any previous problem involving fumes, and that no fumes-related problem has been recorded since the incident.

On the evening before the incident flight, a compressor wash was carried out on the aircraft in Sydney. Company engineers reported they followed the operator's night curfew procedure and conducted extended low-power drying runs.

The operator used the engine manufacturer's recommended ZOK 27 cleaning fluid for compressor washes. The manufacturer of ZOK 27 confirmed that, when heated, ZOK 27 produces an odour that could be described as 'curry-like'.

ANALYSIS

Fumes in the cockpit were a potential distraction from the task of flying the aircraft during takeoff, a critical phase of flight.

The odour described by the flight crew resembled the odour produced by heating of compressor wash fluid, ZOK 27. The takeoff was on the first flight since a compressor wash the previous evening, so it was highly likely the fumes were linked to that maintenance.

Given that in the Saab 340B, the right engine bleed provided all of the air to the cockpit, and that the odour was strongest in the cockpit, it was likely that the fumes came from the right engine.

The operator reported, however, that the compressor wash was conducted in accordance with their normal procedure at Sydney during night curfew noise restrictions and was unable to explain the subsequent ingress of fumes to the cockpit and cabin. Routine use of that modified compressor wash procedure by the operator has not resulted in any problem involving fumes either before or since the incident.

In the absence of a specific Saab 340B checklist procedure to be actioned in the event of fumes, the flight crew mitigated the effect of the fumes by breathing oxygen and continued the flight.

A strong influence on the pilots' decision to continue the flight was their belief that the fumes were from compressor wash fluid and were likely to dissipate. Their monitoring of the situation, including aircraft systems indications, cockpit air quality, and the flight attendant's reports of conditions in the cabin confirmed that to be the case.

FINDINGS

From the evidence available, the following findings are made with respect to the fumes event on Saab 340B aircraft, registered VH-RXX, and should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing safety factors

- During takeoff, pungent fumes entered the cockpit and cabin.
- It was likely that the source of the fumes was a result of residual ZOK 27 compressor wash fluid remaining in the right engine bleed air system.