

**Aviation Safety Investigation Report
199401360**

**Cessna Aircraft Company
Chancellor**

25 May 1994

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NOTE: All air safety occurrences reported to the ATSB are categorised and recorded. For a detailed explanation on Category definitions please refer to the ATSB website at www.atsb.gov.au.

Occurrence Number: 199401360 **Occurrence Type:** Incident
Location: Bundaberg
State: QLD **Inv Category:** 4
Date: Wednesday 25 May 1994
Time: 1330 hours **Time Zone** EST
Highest Injury Level: None

Aircraft Manufacturer: Cessna Aircraft Company
Aircraft Model: 414/A1
Aircraft Registration: VH-JEH **Serial Number:** 414A0834
Type of Operation: Non-commercial Aerial Ambulance
Damage to Aircraft: Minor
Departure Point: Brisbane
Departure Time: 1105 EST
Destination: Rockhampton

Approved for Release: Friday, September 16, 1994

The aircraft was departing Bundaberg on the second leg of a ferry flight from Brisbane to Rockhampton. The take-off was rejected, during the initial stages of the ground roll, after the pilot noticed a low manifold pressure indication for the left engine.

During the subsequently ground run to determine the cause of the low manifold pressure, smoke was observed coming from the left engine compartment. The engine was immediately shut down and the engine fire extinguisher activated.

Later examination of the engine found that the right exhaust collector for the turbocharger had broken away, near a slip joint coupling. Hot exhaust gases escaping past the broken section caused extensive heat damage to the lower inboard engine nacelle skin and the right engine bearer.

Specialist metallurgical examination of the failed pipe has concluded that the exhaust pipe had failed due to high temperature corrosion. It further concluded that the failure was initiated by localised hot pitting attack (corrosion) on the inner surfaces of sections of the exhaust system. In one section of the pipe, pitting had led to the perforation of the weld deposits in the lap joints. A second failed section showed extensive pitting around the circumference of the pipe which led to separation of that section. The report advised that the development of the pitting attack responsible for the failure of the exhaust system was dependent on the combination of a number of factors.

The deposition of oxides from the products of combustion, predominately lead oxide.

The reaction of these oxides with the oxide film formed by the heat resistant alloy in response to exposure to elevated temperatures.



Operating the engine under conditions which result in the temperature of elements of the exhaust system exceeding the melting point of the oxide mixture.

Features of an exhaust system, such as bends and slip joints, that increase the temperature locally or concentrate the products of combustion may also contribute to the development of localised pitting attack.

During the investigation other evidence was obtained which indicates the engines for this aircraft may have been operated for extended periods at excessively lean settings. It is probable that this lean operation provided the elevated temperatures which was one of the contributing factors in the initiation of the localised pitting attack (corrosion).

