Aviation Safety Investigation Report 199301421

Piper Aircraft Corp Aztec

20 May 1993

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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:	199301421			Occurrence Type:	Accident
Location:	Mt Wilkin (14	0 km NW E	merald)	occurrence ryper	110010011
State:	QLD		,	Inv Category:	3
Date:	Thursday 20 M	Iay 1993		<b>.</b>	
Time:	0606 hours			Time Zone	EST
<b>Highest Injury Level:</b>	None				
Aircraft Manufacture Aircraft Model: Aircraft Registration: Type of Operation: Damage to Aircraft: Departure Point: Departure Time: Destination:	r: Piper Aircra PA-23-250 VH-NCS Charter Substantial Emerald QL 0540 EST Mount Wilk	ft Corp Passenger D in QLD	Serial N	umber: 27-765417	0

**Crew Details:** 

	Hours on				
Role	<b>Class of Licence</b>	Туре Но	urs Total		
Pilot-In-Command	Commercial	1000.0	8600		

Approved for Release: Tuesday, June 7, 1994

Shortly after commencing descent from 6,000 ft, the pilot reported that the right engine began to run roughly, which was followed soon after by a loud bang and the appearance of flames around the engine. The pilot shut down the engine, feathered the propeller and turned off the fuel, magnetos and alternator. However, these actions had no effect on the intensity of the fire.

Because it was still dark at ground level, the pilot elected to continue the 40 km to the planned destination. The intensity of the fire appeared to diminish as the flight continued and finally self-extinguished just prior to landing.

Inspection of the engine found that the #1 piston to crankshaft connecting rod had separated at the crankshaft end and had broken a hole through the lower forward crankcase. Engine oil being drawn through the broken section of the crankcase ignited when it came into contact with the hot exhaust manifold. The ensuing fire, being fuelled by a quantity of oil from the crankcase, caused substantial damage to the engine cowls, engine bay, lower right wing and landing gear door panels.

Metallurgical examination of all of the connecting rods and bearing shells from the engine revealed that the #1 connecting rod had failed as a result of fatigue which had initiated at multiple sites on both sides of the connecting rod.

The examination found the presence of aluminium oxide particles in the engine lubrication system. It was concluded that these particles had acted abrasively on the bearing shells which resulted in the breakdown of the hydrodynamic oil film during engine operation. This in turn caused overheating and the eventual breakup of the bearing shells.

The engine had been in service for a total of 4,623 hours, and was overhauled 427 hours prior to the failure.

Aluminium oxide beads of the type found in the engine are used in most maintenance workshops and overhaul facilities as a bead blasting medium.

The overhaul facility which carried out the last overhaul of the failed engine advised that they do not use any form of bead blasting to clean internal engine components or crankcases. The facility did use aluminium beads in their bead blast machine but it was used only to clean external engine parts.

It was not determined how the aluminium oxide beads entered the oil system.

## SIGNIFICANT FACTORS:

1. Aluminium particles were introduced into the engine lubrication system at an undetermined stage of its life.

2. The aluminium particles interfered with the proper lubrication of the connecting rod bearings.

3. The engine failed as a result of overheating of the bearing shells which led to the breakup of the #1 connecting rod.

4. The fire resulted from the released engine oil being ignited by hot engine components.